CQ-TV MAGAZINE No.152

BRITISH AMATEUR TELEVISION CLUB

NOVEMBER 1990

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MEMBERSHIP

FULL YEAR: Subscription to the club is £9.00 per year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page–2 of this issue.

OVERSEAS MEMBERS are asked to send cheques bearing the name of the banker's London agent. Postage stamps are not acceptable as payment. Overseas airmail is extra – please enquire from Dave Lawton or see the rates list with your last subscription reminder form.

The British Amateur Television Club is affiliated to the Radio Society of Great Britain and has representatives on the committee of the European Amateur Television Working Group.

The BATC is registered under the DATA PROTECTION ACT – all queries to Dave Lawton, and VAT registered – number 468 3863 01.

CQ–TV is produced by the British Amateur Television Club as its official journal and is sent free to all members. It is not for general sale.

The BATC is a non–profitmaking club run by a committee elected from the mebership for the benefit of the membership.

Please note that any opinions expressed in this magazine are those of the writers, and do not necessarily reflect the opinions or official policy of the committee or the editor.

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WHO TO WRITE TO

Members of the BATC committee are available to help and advise club members on any ATV related subject. Remember that all such work is done in spare time, so please try to keep such queries to a minimum.

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine or forthcoming BATC publications. Articles; review items; advertisements; other material. EDITOR: MIKE WOODING G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF Tel: (0788) 890365 (Answerphone).

CLUB AFFAIRS - video tape library; technical queries, especially related to handbook projects: TREVOR BROWN G8CJS, 14 Stairfoot Close, Adel, Leeds LS16 8JR. Tel: (0532) 670115

MEMBERS SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: (0734) 403121

MEMBERSHIP - Anything to do with membership including new applications; queries and information about new and existing membership, non-receipt of CQ-TV; subscriptions; membership records; data protection: DAVE LAWTON G0ANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD: Tel: (0494) 28899

GENERAL CLUB CORESPONDENCE & LIBRARY - Any general club business. Queries relating to the borrowing or donation of written material. PAUL MARSHALL G8MJW, Fern House, Church Road, Harby, Nottinghamshire NG23 7ED: Tel: (0522) 703348

PUBLICATIONS - Anything related to the supply of BATC publications. IAN PAWSON G8IQU, 14 Lilac Avenue, Leicester LE5 1FN Tel: (0533) 769425

EXHIBITIONS AND RALLIES - also arrangements and information about lectures and talks to clubs; demonstrations etc: PAUL MARSHALL (address as above).

CLUB LIAISON - and anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: (0525) 290 343

PUBLIC RELATIONS AND PUBLICITY - IAN SHEPHERD, Grosvenor House, Watsons Lane, Harby, Melton Mowbray, LE14 4DD. Tel: (0949) 61267

TVI & RADIO INTERFERENCE - problems of this nature to: LES ROBOTHAM G8KLH, 38 Ennerdale Avenue, Stanmore, Middx. HA7 2LD. Tel:(01 907) 4219 (not committee).

CONTESTS - BOB PLATTS G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent. Tel: 0283 813181.

CQ-TV AWARDS - BOB WEBB G8VBA, 78 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs, DE13 9AB. Tel: 0283 814582

Where possible it is better to telephone your query rather than write. Please do not call at unsocial hours. As a guide, try to call between 6.30 and 9.30pm evenings and not before 11am at weekends.

POSTBAG

MIKE BARLOW

Dear Mike,

Many thanks for the copy of CQ-TV received a couple of weeks ago. I must congratulate you on a super job of the front cover. Everyone here was impressed by it.

We were very touched by the obituary written by Grant Dixon and Don Reid and it made us very proud of Mike.

I had already dropped a line to Grant, so if you are talking to him do thank him for his contribution. Don I will be writing to in a few days.

It's very rewarding to see how CQ-TV has blossomed over the year, I know Mike was very encouraged to see it surviving and flourishing so.

Again many thanks, and keep up the good work. Regards ... Margaret Barlow, Canada.

TRANSISTORS

Dear Mike,

We don't seem to have a QSO these days so I thought I would write to you. This is rather a mis-statement as Maud my wife has to write these days because as well as my heart trouble I have diabetes and a cataract on both eyes and am awaiting an operation to remove them.

I wonder if you could publish a list in CQ-TV of suppliers of transistors for 70CM and more importantly 24CM. I am looking forward to building again after the operation.

I hope you are keeping well, remember me to John G3YQC (who?).

73 ... Arthur G5KS

Sorry about the lack of QSO's of late Arthur, but what with CQ-TV and my own new publishing business, my correspondence course, etc., etc., I often only come on the air at odd times. Concerning the lists of suppliers, I shall put our resident expert, Peter Delaney (he of Members' Services fame) onto this project and hopefully will be able to publish a list in the next issue ... Ed.

CAMTECH - THANK YOU

Dear Mike,

I would like to personally thank, through CQ-TV, the cooperation of Mr.David Allen of Camtech Electronics. His help and advice to me in solving a problem for me was greatly appreciated.

Thanks .... Eric Edwards GW8LJJ

GB3VR - WORTHING

Dear Mike,

Please could you notify the membership that my address has changed and that all mail for the Treasurer of the Worthing and District Video Repeater Group should be sent to the new address shown below.

You might also like to know that 'VR is still ticking along quite nicely, and we have just changed aerials again, to Jaybeam. The new aerials don't seem any better or any worse than the previous quad-loops, but the old aerials were rusting away.

The transmitter on 'VR is now a Solent 1W with a small PA running 24 hours a day, which it has been for close on two years and so far without a hiccup.

73 ... Robin

R.STEVENS, TREASURER WORTHING & DISTRICT VIDEO REPEATER GROUP, 21 St.JAMES AVENUE, W.SUSSEX, BN15 0NN.

NEWS ROUNDUP

DISH SCANS WIDER SKIES

GEC's Marconi subsidiary has developed a satellite dish that could give simultaneous reception of both Sky television and British Satellite Broadcasting.

A key feature of the dish, which is yet not in production, is its field of view of around 60 degrees, which is wide enough to cover every major satellite in Europe. The aerial is reported to be 'squarish' but could be round, and is about the same size as an Astra dish.

The cost of the aerial is projected at around £400, which is comparable to the cost of a steerable dish system. However, the unit is unlikely to be available in the U,K, because at present BSB is refusing to authorise the production of receiving equipment capable of receiving both Sky and BSB transmissions.

MEMBERS' SERVICES

Included in the Members' Services lists will be found two new items, both courtesy of one of our New Zealand members, Wayne Griffin - who can supply these and other PCB's from new Zealand. The new BATC boards are the TDA2000 Coder, from the Amateur Television Compendium, and a Grey scale and Colour Bar generator, based on that by Bryan Dandy. the TEA2000 IC, delay line and inductor needed for the coder are available from Maplin Electronics.

BATC Members' Services does not hold stocks of BATC Publications, and vice versa. Please note that only the items listed in the CURRENT 'Services for Members' supplement in this magazine are available - a description of most of the various PCB's and components can be found in the 'What's What' supplement included with CQ-TV 149. To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order, i.e: 15% of total; goods AND postage, unless an overseas member. Payment should be by cheque or crossed postal order in favour of BATC -do NOT send cash or postage stamps please.

Batches of call sign badges are sent to the engravers once per magazine cycie. Please ensure that your order reaches BATC Members' Services by the CQ-TV close-for-press date, given at the foot of the 'Contents' page in each issue. badges are distributed to members as soon as they have been engraved. members are advised to check the availability of items limited to stock (marked ** in the Members' Services list) before placing their order.

VIDICONS

Tubes available from Members' Services include electrostatic or deflection, and low-light types not previously available.' to club members. Prices vary depending on the size, type and grade of tube. A tube guide appeared in CQ-TV's 149 and 150. Please contact Members' Services for further information. The stripe filter tubes used in domestic type colour cameras are not available through the BATC, and normally must be ordered direct from equipment suppliers.

VIDEOCONFERENCING

A new electronics system from GEC-Plessey, System261, which cuts the cost of videoconferencing appreciably, has recently been used for the first time in a transatlantic link-up between Intelmart, the world's leading teleconferencing exhibition and conference in Washington and a videoconferencing studio near London.

Videoconferencing is the fast-growing

technique of holding face-to-face business meetings by sending pictures, voice and data over a digital telephone link. However, to ensure a high-quality picture, a transmission has until now needed the equivalent of up to 32 lines for just one conference. By contrast, System 261 can operate over just one line.

LIFE IN THE WEST MIDLANDS?

Dear Ed,

Having put the Worthing 24CM TX/RX on display at Harlaxton (thanks for the mention in the report) I would like to confirm that Arthur Bevington G5KS is still very much around in Oldbury, West Midlands, and that pictures were exchanged with him a few days after the convention. I would like to thank both Arthur and his wife Maud for the help and hospitality they have extended to me recently.

I have now acquired a Wood & Douglas 24CM RX; using a preamp the Stoke repeater (GB3UD) is just resolvable at Arthur's QTH. Unfortunately, I cannot pick up the Coventry box (GB3RT), either here in South East Birmingham, or from my nearest high point, Barr Beacon!

However, the main thing both Arthur and I need here around Birmingham is activity! If there ARE any members on 24CM in the Solihull area please ring my ansaphone on (021) 707 4337. Thanks for an EXCELLENT mag! ... 73 Graham Hankins G8EMX.

Many thanks for the missive Graham, although I have edfited it somewhat here. Concerning not receiving GB3RT from Barr Beacon! try connecting the aerial HI. Geoff G3DFL and John G1GST (who?) both receive it from their respective QTH's at Warley and Sedgley. Seriously folks, let's get some activity going in the Birmingham area on 24CM ... alternatively Graham, you could always look east towards our net in the Coventry and Rugby area. Try calling G1IJT, G0HOV, G8ONX, G6WLM, G6IKQ and up in Leicester G4EUF (don't forget next time!!) or even me!! ... 73 Mike.

The club has been donated a quantity of ex-broadcast equipment for distribution to MEMBERS, if you are interested please contact me and it could be yours for a suitable donation to funds. Please note ALL items will have to be collected, ON A FIRST COME FIRST SERVED BASIS as the space is urgently required, from me or by arrangement in Lincoln. As I am away a lot please leave a message on my answerphone 081 998 4739 if I am not at home. B. Summers.

Vide-Pro (USA), looks like a Barco, three tube projector unit

Sony Triniton 11" monitor - working!

Talkback relay unit + Audio relay unit

3u high rack mount case

14" Pye mono monitor 405/525/625 line standard, labelled U/S

PSU's :- +\- 24v twice @ 1A. ; and 24v four times @ 3A.

4 counter display unit with nixie type indicators

Rack with 5 Westrex audio Amplifier units (BBC style) & PSU

3 control panels with faders & lamps (EX lighting control)

25yds 15* twin screened cable

S100 computer units Z80 based with printer & data ports, PSU, 19" rack

Pye battery charger .... Thorn Dimmer test set.....

"Logica" Teletext computer controlled decoder unit, 19" 3u Vero nice.

Astronic graphic equaliser control panel

CRT's for Tek scopes 528,528a,521,465,1481,& H.P.191a condition suspect

19" rack unit 3U with smoked perspex front with psu & one card.

IVC Mono mixer MEA 5100 new & boxed

Pye lynx camera

Sony 2100ace mono vtr - working

Phillips 12" mono monitor - working, not too big.

BBC white units ;- PS2/112 (+18V.) UN1/643 UN1647 (TK units)

Link PSU 317 + Sawtooth gen 320 in 3U 19" rack.

RS 591-499 soldering iron psu 115v ac input 24v o/p.

Video crispener, horz & vert. Electrocraft, selfcontained modern.

Video half line delay unit Electrocraft, modern

Eurocard frame standard Vero type suitable for BATC eurocard projects

PYE PAL DECODER, 3U rackmount ... £10.00. Dynamco 35 mHz. double beam Scope, full delayed timebase, portable style case, optional waveform monitor Y- amp unit, handbook, in working order, except for one minor fault ... £150.00 ono. Musa jackfield with links bnc's on rear as new ... poa. Marconi VTR monitor bridge control unit for 1" C format machines nice new condition ... poa. Decca off air RX 5 video o/ps + balanced audio, working ... £15.00. Sony rf modulator for U-Matic RFU-50UB ... £5.00 post paid. Brian Summers G8GQS. Tel: 081 998 4739.

EDITORIAL

Mike Wooding G6IQM

Well summer is just about over and what a summer it has been again. Unfortunately all this good weather has done very little for ATV, both in the fact that conditions have generally been very flat and also with most operators enjoying the sun, bar-b-q's etc. instead of sweating it out in hot shacks.

Talking of hot shacks the weather broke last year;'s record as far as temperatures in my shack were concerned - this year's high was 112.5 degrees F!

GB4TCF

A highlight locally in recent events was the annual bash at the Town and Country Fair at the National Agricultural Centre at Stoneleigh, Nr. Coventry.

This event always sports a special event station GB4TCF and again as part of that event Tony Howes G0HOV (one of the GB3RT group) put on a splendid ATV station, operating on both 70CM and 24CM.

Although the site occupied by the special event station is not the best in the world, a great deal of enjoyment was had by Tony and all the locals. Even GB3RT got used!!!

Seriously though, this sort of event station is a great public relations operation, with masses of the public attending the event, a great deal of them visiting the station. Congratulations to all involved, and in particular to Tony and David G1GPE who were in control (???) of the ATV station.

CHRISTMAS CARD

Now what on earth is he one about I hear you say. Well, this is just to tell you that the label carrying card from this issue that you threw in the waste bin is a Christmas Card from the Committee to you and your family - Oh Well! Merry Christmas anyway.

COLOUR ATV TRANSMISSIONS

I have been asked by your Committee to remind you that it is against our interests to transmit colour pictures on 70CM, and is to be strongly discouraged. The reasons are to enable to argue for retention of the 70CM ATV allocation. By not transmitting colour pictures (nor using any intercarrier sound etc.) we can restrict our bandwidth considerably, thus minimising any interference with other users of the band. I know that in many areas severe interference is suffered by ATV'ers from Packet communications etc., but that **IS NO ARGUMENT** for causing interference ourselves.

Do not misunderstand me, we do not suffer in silence, your Committee and our representatives on other bodies are continually campaigning these matters. But we must be seen to be playing our part.

In the next issue I shall be re-publishing the circuits and details of the video filters for inclusion between the video source(s) and 70CM transmitters. These filters adequately suppress the video bandwidth to around 3MHz, thus reducing the total transmitted spectrum to around 6MHz for our double-sidebanmd ATV transmissions.

Please co-operate with this request - the alternative is that we could lose our allocation on 70CM - the not so thin end of a short wedge!

LETTERS TO THE EDITOR

Or should I say the lack of letters. I do have to apologise to one member who wrote to me concerning the sad loss of our founder Mike Barlow, I did inform him that I would be publishing it in the magazine. However, that little mains-borne gremlim hereabouts managed to get in and corrupt a data file

again. Mind you I've got him nailed now - due to expansions in the equipment here for my business I have also installed an intelligent (about the only thing in this office that is!) mains current/voltage filter network - or gremlin gobbler!

To return to the subject of CQ-TV post - where is it? Why for you stop writing to me? Is it my after shave? **PLEASE, PLEASE** write to me - I get lonely!

I²C - A BATC SPECIAL PROJECT

By now you will have at least glanced through the first part of the new book 'I²C - A BATC SPECIAL PROJECT'. A new departure this for the editorial/publication department, in that we are producing, eventually, a complete project book, but in supplement form. This method has the distinct advantage that we will be able to easily update information on the project by simply publishing extra parts, even after the main book has been completed. At present I understand that we will be publishing around 8 parts, to produce a book totalling around 60 or 70 pages, which I hope we will be in a position to supply a binder for at a very reasonable cost.

By supplying this project book in this supplement form we are able to ensure that all members get a copy - **FREE OF CHARGE.** This is by way of saying thank you for maintaining your membership even though we were forced by the economic climate to increase the subs by 50%.

Also, it will allow those of you who intend to build up the unit to do so one step at a time, thus enabling us to deal with any problems you may have all at the same time. Additionally, software upgrades that may become available as time goes on will be available at the right time.

I would like to add my thanks to the project team of Trevor Brown G8CJS, Chris Smith G1FEF and Bob Robson GW8AGI for their efforts over a not inconsiderable period of time getting this project off the ground. My contribution to this project is to attempt to assemble all the information into something that resembles readable and understandable text - if only it came sooner than two weeks before closing date!

We sincerely hope that many of you take up this project, as it could prove to be a valuable aid in the shack/home and an interesting and entertaining exercise.

As Trevor Brown states in his introduction to I²C elsewhere in this magazine, please order your first (VDU) printed circuit board as soon as possible, in order that we can gauge the take-up of the project and thus decide on ordering quantities for PCB's and special components as time goes on.

MEMBERSHIP RENEWALS

DON'T FORGET - THOSE OF YOU WHO HAVE MEMBERSHIP RENEWAL FORMS ENCLOSED WITH YOUR MAGAZINE, THIS MEANS THAT YOUR MEMBERSHIP IS NOW DUE -PLEASE DO NOT DELAY - HELP DAVE LAWTON OUR MEMBERSHIP SECRETARY AND SEND IN YOUR SUBSCRIPTION AS SOON AS POSSIBLE - TAKE ADVANTAGE OF THE SPECIAL REDUCTIONS FOR SEVERAL YEARS SUBSCRIPTION AT ONCE - THANK YOU.

THE END

OK that's about it for this time. If you have any comments or opinions that you would like me to discuss etc. in this informal editorial column, drop me a line and I will give them an airing.

Albeit perhaps a little early, this is probably the last chance that I will have.

I would like to wish you all a very Merry Christmas and a Happy New Year, from myself and my long-suffering lady Kim, who has to put up with so much due to my being editor etc.

If you have any ideas for CQ-TV in the way of articles, features, reviews, criticisms etc, drop me a line and I will give them an airing. Please drop me a line to the usual address, as shown on the 'Who To Write To Page'.

73 .... Mike

VIDEO MIXING DESK AND EFFECTS GENERATOR

Part-2

The series of articles making up this project first appeared in the January, February, March and April issue of Elektor Electronics, and we wish to thank the Editors for their permission to reproduce them in CQ-TV.

A Rigby and G.Dam

Last issue's introductory article described the general setup of the video mixer, and discussed the operation and construction of the video switching board. In this issue we turn our attention to the modulation board, which supplies two sets of modulation waveforms that together put many attractive picture mixing, wipe, fade-in and fade-out effects at your disposal.

As already discussed in part-1 of this project the video mixer consists of three blocks: a video switching board, a modulation board and a keyboard. These blocks form the basic configuration of the mixer as shown in Fig.1 in CQ-TV 151. The modulation board and the keyboard receive a number of synchronisation signals and the supply voltage from the video switching board. The keyboard circuit supplies all the necessary control signals to the video switching board and the modulation board.

EFFECTS WAVEFORMS

All picture mixing effects provided by the video mixer, and all combinations thereof selected by the user, are based on three elementary waveforms: the triangle, the ramp (linearly rising sawtooth) and the parabola. All three are available in the horizontal (line-synchronous) as well as the vertical (raster-synchronous) picture plane.

All picture mixing and combination effects rely on the switching between two video sources. A left-to-right wipe (curtain) effect, for instance, requires a circuit that switches between two video sources at accurately defined instants in the picture line. The HSW signal is used for this purpose. Similarly, the VSW signal is used if the wipe effect is required vertically (top to bottom). Both HSW and VSW are rectangular signals whose duty factor variation is controlled to obtain the wipe effect. The required duty factor variation is secured with the aid of a comparator that compares a ramp voltage to a reference voltage set with the wipe control (a slide potentiometer on the front panel of the video mixer). The other picture mixing and effects are obtained by combining different patterns, horizontally as well as vertically.

BLOCK DIAGRAM

The waveform generators for the mixing effects are shown to the left in the block diagram in Fig.6. Since the same waveforms are in principle required horizontally and vertically (only the frequency is different) almost identical generators are used. In both cases the waveforms are synchronised with the video signal. The parabola and triangle waveforms are derived from the ramp voltage. All three waveforms are applied to comparators via electronic switches.

Depending on their function the comparators supply either a horizontal (HSW) or a vertical (VSW) switching signal.

A separate modulation input allows additional control over the selected effect. The modulation signal applied to this input may be synchronous or non-synchronous in relation to the picture.

Depending on the available video material and the applied waveform, remarkable and sometimes quite unpredictable effects may be obtained in addition to the ones provided by the video mixer.

The horizontal and vertical keying inputs enable 'home made' patterns to be added to the picture.

A buffer and an inverter feed the selected vertical waveform to the horizontal comparator, which compares it to the waveforms generated in synchronism with the horizontal line pulses. The inverter may be switched on and off by a control on the keyboard. Depending on the levels applied to the comparator an HSW signal is supplied that switches between two video sources at a particular instant in the picture line. This combination of vertical and

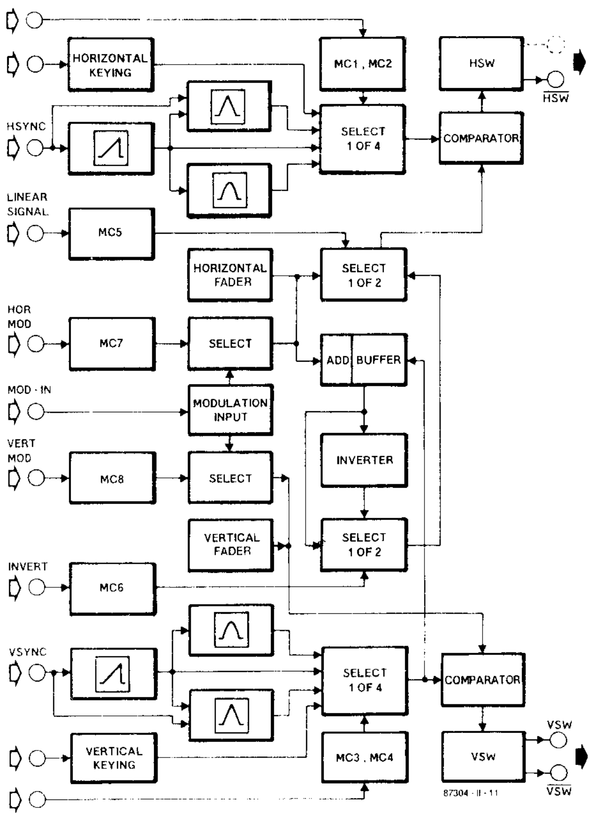


Fig. 6 Block Diagram of the Modulation Board

horizontal waveforms allows fairly complex mixing effects to be realised.

The vertical waveforms are available in non-inverted as well as inverted form. the selection is made by the user with the aid of a keyboard control, and allows two video signals to be transposed on the screen. Taking the previously mentioned vertical wipe effect as an example, the invert control allows the 'top' and the 'bottom' pictures to change places in the mixed image.

CIRCUIT DESCRIPTION

The circuit diagram of the modulation board is shown in Fig.7. The three-stage horizontal waveform generator is shown in the top-left hand corner. The almost identical vertical waveform generator is found in the lower left-hand corner. The following description of the operation of these circuits refers to the horizontal waveform generator IC26, IC27, IC28, IC29a, T6 and IC40.

The HSYNC signal is applied to the waveform generator to ensure that this is synchronised with each picture line. During the HSYNC pulse capacitor C61 is discharged via N47, so that integrator IC26 can start from zero at the end of the pulse. The result of the integration is a line-synchronous ramp voltage at the output of IC26. To produce a triangle voltage the ramp is first converted into a rectangular wave by comparator IC27, which compares the instantaneous amplitude of the ramp to the reference voltage at the wiper of preset P6. The rectangular signal so obtained is applied to integrator IC28a, which charges or discharges C70 as the output of IC27 goes high or low. The result of this second integration is a triangle voltage at the output of the op-amp.

The horizontal synchronisation pulse, HSYNC, causes the integrator capacitor C70 to be completely discharged via N51 at the start of each picture line. Preset P6 determines the switching level of the comparator and with it the symmetry of the triangle voltage, while preset P7 sets the amplitude.

Transistor T6 converts the triangle voltage applied to its base via preset P5 into a parabolic voltage, which is subsequently amplified by IC28b. The amplitude and the off-set voltage of the parabolic waveform are adjusted with presets P8 and P9 respectively.

The vertical waveforms are obtained in a manner similar to the horizontal ones. However, the frequency is 50Hz instead of 15625Hz, and VSYNC is used to ensure vertical synchronisation to the mixed picture.

Demultiplexers IC29a and IC29b together determine the waveform selection for the mixing effects. This selection is accomplished in conjunction with electronic switches N52-N55 and N56-N59. Depending on the logic levels on control lines MC1-MC2 (IC29a) and MC3-MC4 (IC29b), either the ramp, triangle, parabolic or KEY signal is used. The selected signal is applied to op-amp IC34a for comparison with the voltage at the inverting input, which takes either a steady voltage or one of the vertical waveforms.

The signal at the non-inverting input of IC34a is selected by electronic switches N61 or N63. To ensure that the effects selection remains in synchronism with the raster, these switches are controlled in complementary fashion by bistable IC33b. the other bistable in the 74HCT74 package, IC33a, functions as a monostable multivibrator. It is clocked with VSYNC and supplies short pulses at its bar-Q output. These pulses clock IC33b and time the instant it latches the logic level of control line MC5 connected to its D (data) input. The latched level is subsequently transferred to the Q and bar-Q outputs.

The direct voltage supplied by the horizontal FADING control, P15, may be applied to the input of IC34a by switching

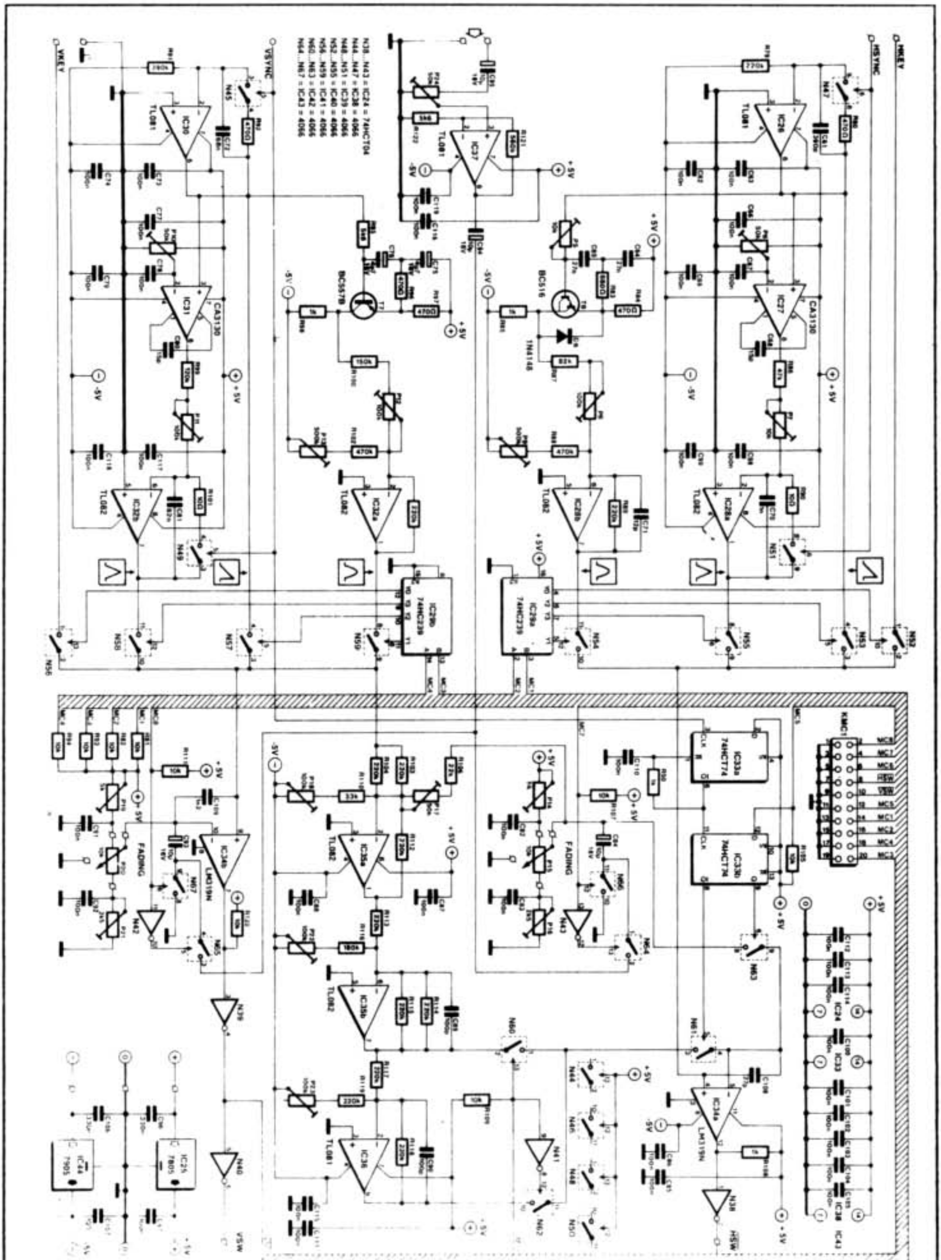


Fig. 7 Circuit Diagram of the Modulation Board

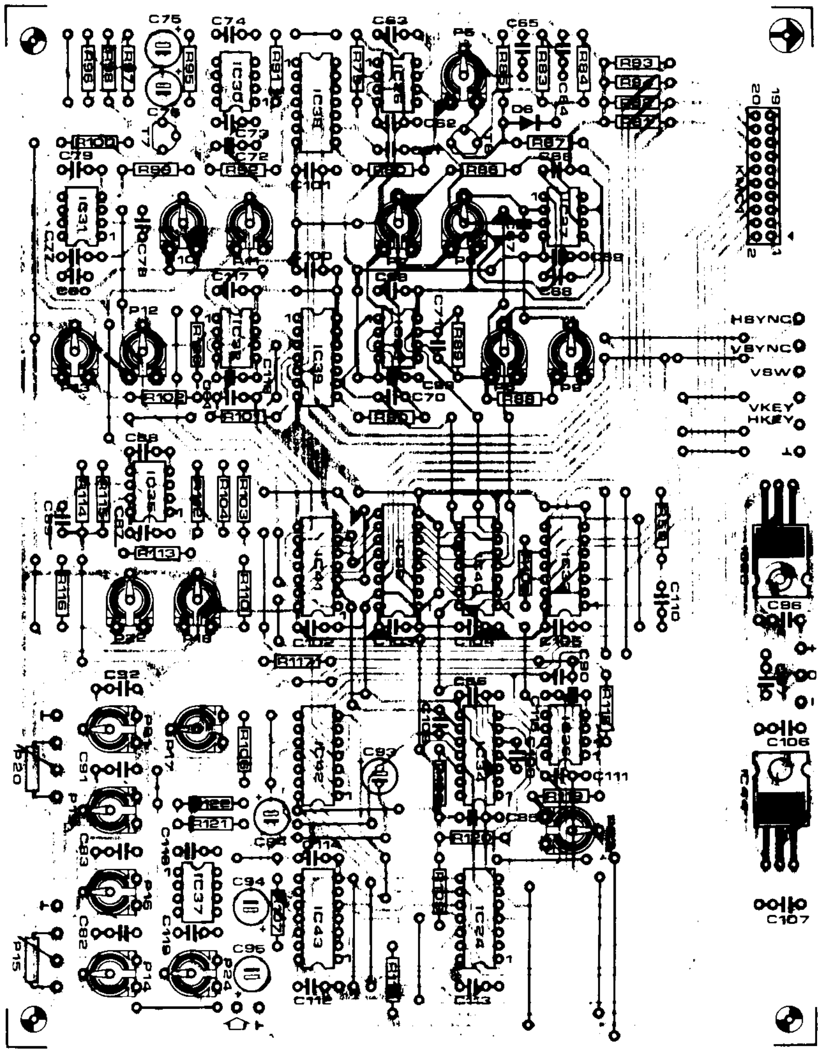


Fig. 8 Component Overlay of the Modulation Board

on N63. the toggling of the bar-HSW signal supplied by inverter N38 determines the border between the mixed pictures - in other words, the location (or instant) in the picture line at which the switching between the two video sources takes place. Presets P14 and P16 serve to give potentiometer P15 its maximum usable range, ie: the width of the picture.

Capacitor C84 allows an alternating voltage to be superimposed on to the direct voltage at the wiper of P15. This alternating voltage is taken from the external effects input and first buffered by IC37. If the external input is not used, the negative terminal of C84 is taken to ground by switch N66. This is done to prevent noise being picked up, which would cause interference in the mixed picture.

The modulation signal supplied by IC37 is also applied to comparator IC34b, which adds it to the direct voltage supplied by vertical FADING control P20. The selected vertical waveform is applied to the positive input of the comparator. The output signal is VSW or bar-VSW which indicates the vertical (raster-synchronous) switching instant.

Series-connected opamps IC35a, IC35b and IC36 form a precision inverter or buffer for the vertical effects waveform selected by the user vis N56, N57, N58 and N59. Presets P17, P18 and P22 are adjusted to cancel offset voltages in the three stages.

The fairly extensive compensation is required to ensure that the output of IC36 supplies the exact inverse of the signal applied to the external effects input. Control line MC6 is used to select between the inverted and non-inverted version of the vertical effects voltage.

CONSTRUCTION

The single-sided printed circuit board for the circuit is shown in Fig.8. Construction should not present problems to the experienced constructor at whom this project is aimed.

Start the construction of the board by fitting all the wire links. Next mount the solder pins, connectors and IC sockets, if used. Check your work so far and proceed with the passive components and the single diode. Be sure to observe the polarities of the electrolytic capacitors and the diode. Next mount the voltage regulators, bolting them direct to the PCB - heat sinks are not required.

Lastly, plug the IC's into their sockets or, if sockets are not being used, solder them into the PCB. The slide potentiometers are mounted onto the keyboard PCB to be discussed in part-3 of this series in the next issue. Set all presets on the modulation board to the centre of their travels.

The printed circuit board for the modulation section of the video mixer as described above is available from Elektor Electronics (Publishing), Down House, Broomhill Road, London, SW18 4JQ.

The reference number is 87304-2 (Video Mixer 2) and the cost £16.25 plus £2.44 VAT and £2.00 p&p for Europe or £4.00 p&p surface mail or £6.00 air mail.

ATV CALLING: 144.750

SSTV CALLING: 144.500

MIKE BARLOW
HIS AUTOBIOGRAPHY

NAME: Michael William Salanson Barlow

BORN: October 20th 1929, Chelsea, England. Became Canadian citizen 1964

DIED: May 14th 1990.

PARENTS: Harold Ernest Barlow (deceased, was Company Secretary J. Lyons & Company, Cadby Hall, London). Gladys "Sally" Barlow (deceased) Late of Maughold, Isle of Man.

MARITAL STATUS: Married Margaret Winifred Legge of Cambridge. Son Stephen Richard born 1956. Daughter Jacqueline Shirley born 1958.

EDUCATION: Thorpe House School, Gerrards Cross, Bucks. 1936-42

Scholarship to King William's College, Castletown, Isle of Man. 1942-1948 (Walters House)

County Scholarship to St. John's College, Cambridge. 1950- 1953

NATIONAL SERVICE: Royal Corps of Signals. 1948-1950

DEGREES, ETC: M.A. (Nat. Science Tripos) 1957

Grad. I.E.E. 1953

A.M.Brit.I.R.E. (now C.Eng. A.M.I.E.R.E.) 1957

Fellow of S.M.P.T.E. 1967

Prof. Eng. (Ontario) 1970

Corp of Engs. of Quebec 1973

TECHNICAL EDUCATION: City & Guilds Radio Amateurs Certificate (G3CVO & G3CVO/T)

Instructor Radio Mechanic, All Royal Corps of Signals.

Post Grad. course Marconi College

POSITIONS HELD: Development Engineer, TV Transmitter Modulators, Marconi 1953-1957.

Emigrated to Canada, November 1957.

Broadcast equipment sales, Canadian Marconi Company 1957-1958.

Development Engineer, Advanced Doppler Systems, Canadian Marconi Company. 1958-1960

Broadcast Engineer, CFCF-TV, AM, FM, and SW. 1960-1964

Canadian Broadcasting Corporation, Plant Dept 1964-1966 Senior Engineer, Studio Systems Department 1967-1972 Supervising Engineer 1973-1989.

IMPORTANT ENGINEERING ACCOMPLISHMENTS:

Development of Crystal Palace TV Transmitter Blanking Feedback System.

Advanced design of Helicopter Doppler Systems. 1959

Design and installation of Montreal Mount Royal transmitter complex (Nineteen TV, HF and VHF Transmitters). 1960

Installation CFCX Shortwave transmitter and CFQR-FM. 1960

Design and installation CFCFTV Master Control and studios. 1960.

Responsible engineer all transmitter and studio equipment CFCF AM-FM-SW-TV. 1964

Canadian Broadcasting Corporation mobile unit design. 1964

Project engineer - colour conversion of Toronto CBC studios 1966

Special responsibility CBC live cameras. 1968

Assistant to Supervising Engineer responsible for all radio and TV studios in Toronto, Montreal and Quebec City. Plus all mobile units. 1969

Co-ordinating engineer IBC sound recording studios and Quebec City CBVT automation 1969.

Co-ordinating Senior Engineer Radio and TV installations (other than special projects) March 1970.

Co-ordinating engineer for all radio and television automation systems. 1970.

Supervising Engineer, special projects. 1983: Trinidad Scheduling System Captioning for the deaf Satellite cue & control System.

ORGANISATIONS:

1949 - Founder and Secretary, British Amateur Television Club.

1957 - Brit.Inst. Radio Engineers (Am. Brit. I.R.E.)

1957 - Society of Motion Picture and Television Engineers

1958 - Secretary, Montreal Movie Club 1960 - Canadian

Chairman and Montreal Chairman, S.M.P.T.E.

1961 - Editorial board J.S.M.P.T.E. 1963 - Inst. of Elec. & Radio Engineers (A.M.I.E.R.E) (C.Eng)

1963 - Fed. of Canadian Amateur Cinematographers, Vice President.

1964 - Member Canadian CCIR Committee on FM transmission and TV standards.

1964 - Hon. mem. Brit.Amateur TV Club 1965 - Associate Paper Chairman for SMPTE Montreal Convention

1967 - Editorial Board "CBC Engineering Review"

1967 - Fellow of SMPTE

1970 - Association of Professional Engineers of Ontario

1971 - TV Papers Chairman, 110th SMPTE Conference, Montreal

1973 - Corporation of Engineers of Quebec

1974 - TV Papers Chairman, 116th SMPTE Conference, Toronto.

1983 - American Cryptogram Assn

1986 - Editor "The Computer Supplement" of A.C.A.

1988 - Sherlock Holmes Society

PAPERS, ETC:

Contributor to: "Wireless World" "Shortwave Magazine" "Shortwave News" "Shortwave Listener" "RSGB Bulletin" "Amateur Cine World" "CQ-TV" "CBC Engineering Review" "Journal of S.M.P.T.E." "Cryptologia" "The Cryptogram" and others....

Book published: 1952: "An Introduction to Amateur Television Transmission". Editor "CQ-TV" 1949-1957. Editor "Eight-Sixteen Reporter" 1959-1965. "Are Your Schematics Doing Their Job?" -"Canadian Electronics Engineering" February 1960. "Black and White Television Monitoring & Video Levels" Letter to the editor, "Journal of S.M.P.T.E." March 1962. "Bilingual operation of TV Transmitters with minimum Staff" - "Sound and Vision" Vol.3, No.2 Summer 1962. "Video Graticules" letter to the editor, "Journal of S.M.P.T.E." August 1962. "The Operation of High-Power Television Transmitters in Parallel" - "Journal of S.M.P.T.E." January 1963. "Standardization of TV scanning rates" - "Journal of S.M.P.T.E." Feb 1963. "Parallel Operation of TV Transmitters" - "Broadcast Engineering" March 1964. "Modulation Meter for Stereo and SCA" - "Journal of The Society of Broadcast Engineers" June 1964. "Compatibility" letter to the editor S.M.P.T.E." June 1964. "New Graticule for Measuring Television Transmitter Frequency Response" - "Journal of the S.M.P.T.E. November 1964. "Transient

Test Methods of Checking Television Transmitters" - "Journal of S.M.P.T.E." February 1965. "Multiplexing FM-Multiplex" - "Sound and Vision" Wint. 1964/5. "Using the Oscilloscope for RF Monitoring" - "Broadcast Engineering" Oct 1965. "Demand for Television Standards" Letter to the editor "Journal of the S.M.P.T.E" November 1965. "Studio 7, Toronto" - "C.B.C Engineering Review" No.1 - May 1967. "Television Studio Performance Measurements" - "Journal of the S.M.P.T.E" February 1968 "Unipulse Distribution" - "CBC Engineering Review" April 1969. "Coding and Packaging Film for Broadcasting" letter to the editor "Journal of the S.M.P.T.E" October 1969. "Automation of Telecine Equipment" letter to the editor "Journal of S.M.P.T.E." April 1970. "The Remote Control of Multiplexed Telecine Chains" - "Journal of S.M.P.T.E." April 1971. "The Automation of Small Television Studios" - G. Young and M. Barlow "Journal of S.M.P.T.E." Oct 1971. "Some Features of Computer Controlled TV Station Switchers" - "Journal of the S.M.P.T.E." March 1972. "Developments of Automatic Programming in the CBC" - "COM BROAD" Jan 1972. Also published May 1971 "CBC Engineering Review" "Computer Controlled Switching in the CBC" - "CBC Engineering Review" May 1972. Also paper to International Broadcasting Conference Sept 1972. "Reliability" letter to the editor "Canadian Data Systems" Feb 1972. "So Little Faith" letter to the editor "Canadian Data Systems" June 1972. "Clocks and Time Codes in Broadcasting" - "CBC Engineering Review" May 1973. "Developments in Computer Controlled Television Switchers" - G. Young and M. Barlow "Journal of SMPTE" Aug 1973. "Obtaining the Software for an Automation Project" - "Journal of S.M.P.T.E." April 1974. "Toronto Network Control Centre" J.B. Dickson and M. Barlow "CBC Engineering Review" June 1974. "The Design of an Automatic Machine Assignment System" - "Journal of S.M.P.T.E. July 1975. "Implementing a Stereo FM Network in Canada" P. Burgess and M. Barlow "EBU Review" August 1975. "Implementing the FM Stereo networks of the CBC" P. Burgess and M. Barlow "CBC Engineering Review" Sept 1975 - April 1976. "The Assurance of Reliability of Television Automation Systems" - "Journal of S.M.P.T.E." Feb 1976 (Reprinted in SOM Bulletin April 1976 of Independent Broadcasting Authority). "CBC-FM's Stereo Network" P. Burgess and M. Barlow "Broadcast Equipment Today" March/April 1976. "Northern Weather Forecast By Remote Character Generator" - "CBC Engineering Review" April 1976. "The Computer Control of Multiple Bus Switchers" - "Journal of S.M.P.T.E." September 1976. "Automatic Switching in the CBC - An Update" - "IBC" Sept 1976. "A Universal Software for Automatic Switchers" M.Porteous and M.Barlow "Journal of S.M.P.T.E." October 1978. "The Automation of Large Program Routing Switchers in the CBC" - "Journal of S.M.P.T.E." July 1979. "Designing Broadcast Systems for High Reliability" - "Journal of S.M.P.T.E." February 1982. "The Model III - A Step Back for Mankind?" - "Computronics" April 1982. "Technique and Technology for 'The Journal'" F. Fox and M. Barlow CBA Conference June 1982. "High Technology in Remote Areas" - "EBU Review" October 1982. "The Evaluation of Small Project Software" - "Journal of S.M.P.T.E." January 1984. "Personal Computers in Engineering" "ABU Technical Review" July 1984. "Personal Computers in Engineering -the CBC-EHQ Experience" - "Broadcast Technology" Sept/Oct 1984. "Personal Computers in Engineering" "Journal of S.M.P.T.E." Jan 1985. "A Computer-based Scheduling System for Small Radio Stations" - (A Technical Note) "CBC Engineering Review" April 1985. "Couldn't I Use My Computer?" - "The Cryptogram" May/June 1985. "A Machine Solution of the AMSCO Cipher" - "Cryptologia" Jan 1986. "The Voynich

Manuscript - by Voynich?" - "Cryptologia" October 1986.

NOTE 1

There were half a dozen other papers in preparation at the time of Michael Barlow's decease. All were concerned with the American Cryptogram Association interests and manuscripts, both complete and incomplete, and have been passed over to them.

NOTE 2

The information in this bibliography was compiled by Michael Barlow and has been updated from his notes.

NOTE 3

Many thousand pages of text, mostly technical correspondence covering broadcast and cryptography, have been omitted from the foregoing summary.

AN INTRO TO THE I²C BOOK

Trevor Brown G8CJS

Enclosed with this CQ-TV is part-1 of a new project book called I²C. The rest of the book will follow in instalments so that you can put your own I²C book together. the question you may be wondering is what is I²C. It is a 2-wire data system used to control home entertainment equipment. The enclosed book will enable you to put together, using PCB's available from Member's Services, a controller that will give you keyboard access to I²C equipment.

The first module is a VDU which will Genlock or free-run providing an RGB signal. When it is connected to the control card it will display simple menu driven instructions that will enable you to carry out the following functions

Display an internal electronic test card.

Teletype messages for transmission.

Decode incoming Oracle or Ceefax data.

Generate I²C commands for external equipment.

Drive the BATC I²C switcher (design to follow).

All the parts of the project will. be supported by easy-to-assemble PCB's and will be operated by on-screen menus. I hope that by supplying this book to all the membership that then unit will be built in large quantities to enable us to achieve a low unit-cost for the PCB's.

By providing the documentation separate from CQ-TV I hope that it will become a handy reference book with all the necessary information in one place, to enable you to make the most out of this interesting project.

The project will be expandable with revision in software to enable the unit to be used for other purposes, the first of which will be to use it as a tutor to accompany a future series in CQ-TV by Chris Smith, that will teach machine-code programming in a way that will compliment the excellent series on TTL logic by John Wood.

My thanks to the rest of the I²C team: Bob Robson G8AGI and Chris Smith G1FEF, for their help in getting this project up and running.

NOTE: Due to the inability to get all the information to the CQ-TV office in time the details and prices of the PCB's for this project may not appear in the Member's Services supplement. Please send a stamped addressed envelope to Member's Services for full details .. Ed

THE CAMTECH VIDEO-IF BOARD FOR FM ATV

REVIEW

Mike Wooding G6IQM

Introduced at the BATC 1990 convention at Harlaxton the Camtech Video-IF board looked as if it was going to be a long-awaited, very welcome new unit for those active in 24CM FM amateur television. Up until now the only units available for demodulating FM ATV have been the Wood & Douglas VID-IF and the BATC demodulator construction project. Both of these systems also required a separate sound demodulator unit to make a system complete. However, with the introduction of this new unit from Camtech we now have a third choice, one which is a complete audio and video demodulator system, and one which encompasses many of the latest state-of-the-art techniques. So, I duly obtained one from Camtech and put it through its paces, both on the test-bench and, more importantly, on the air.

DESCRIPTION

The unit comes either as a kit, or as a completely built and aligned unboxed board. The printed-circuit-board is of a very high quality and is standard Eurocard size, 160mm x 100mm. At one end of the card is mounted a toggle switch for selecting the video 'sense' (positive or negative going) and a red LED to indicate the DC supply on. At the opposite end of the board are mounted three sockets: a phono socket for the composite video output, a DC socket for the 12V DC supply and a 5-pin DIN socket for the input IF signal and the output tuner AGC signal connections.

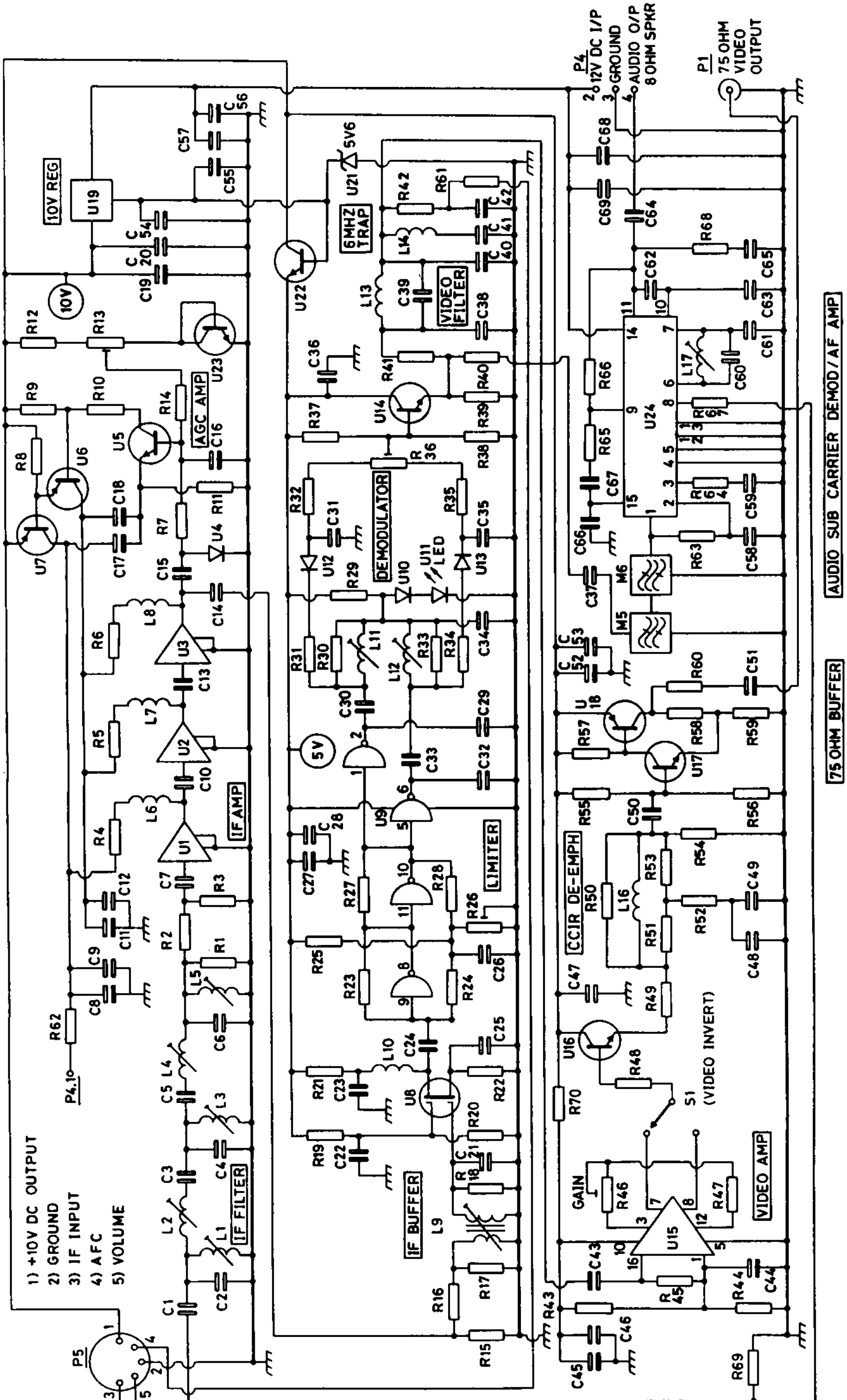
I must note here that on the review model the DC supply input socket was not fitted as standard, but after consultation with Camtech after conducting this review they have opted for my suggestion of fitting this socket to avoid problems which may have arisen with the original supply connection method.

The components are all rigidly mounted on the top side of the PCB, which is total ground-plane area, apart from three Monolithic Microwave IC's (MMIC's) which are mounted in recesses on the under side of the PCB. Connections between the ground-plane and the under-side of the PCB are made where necessary using PCB pins. A 4-pin PCB header is located on the top side of the PCB for the DC supply connections, an AGC test-point and the audio output. However, as stated earlier a separate DC input plug is now fitted as standard at the edge of the PCB.

The documentation accompanying the unit when purchased as a kit is concise and helpful. There are one or two errors which have been corrected on an amendment sheet included with the paperwork, and I can only assume that these will be included in a reprint as soon as possible.

The construction information is adequate and points out the few danger areas to be aware of. Particular note is made to the handling of the MMIC's, and to the necessity of keeping all component leads as short as possible.

The alignment notes, as noted below in the bench test section, are straightforward, and



CAMTECH ©1990
ELECTRONICS

Fig.1 Circuit Diagram of the Camtech Video-IF

provided that they are followed accurately will produce a correctly aligned and working unit.

MANUFACTURER'S SPECIFICATIONS

IF Input Impedance	50 ohms
IF Input Frequency	40 MHz
IF 3dB Bandwidth	16 Mhz
IF Sensitivity	50 uV PD
IF AGC Dynamic Range	60 dB
AFC Output (IF +/- 7 MHz)	2V +/- 0.5V
Video 3dB Bandwidth	12 MHz
Video S/N Ratio	70dB
Video Output Level	1V p-p
Video Output Impedance	75 ohms
Audio Subcarrier Receiver	6 MHz
Audio O/P into 8-ohm L/S	1 Watt
Audio S/N Ratio	60 dB Typ
Audio Distortion	< 5 %
Power Supply Requirement	12V / 0.5A

CIRCUIT DESCRIPTION

The circuit diagram of the unit is shown in Fig.1. The input to, the Video-IF board is via the 5-pin DIN socket, pin-2 is ground and pin-3 is the IF signal input. When an IF signal is applied to the input it is first filtered by a five-section Chebychev bandpass filter. This filter provides the necessary IF selectivity and consists of components L1 to L5 and C2 to C6. Over the pass band the input and output impedance of the filter is nominally 50-ohms. In the stop band, however, the filter impedance is undefined, so that resistors R1 to R3 form a PI attenuator to ensure that the amplifier is correctly matched at 'all' frequencies.

The IF amplifiers U1, U2 and U3 are the MMIC's. They are broad band and provide very high gains (typically >20dB per device). In this application the three amplifiers are cascaded to provide an overall gain of 60dB. The output of U3 is applied to the IF buffer and a diode AGC detector circuit, which operates as follows:

When diode U4 conducts, it produces a negative voltage which is proportional to the input signal. This voltage is used to control the bias current of transistor U5. As the input level is increases the negative voltage developed across U4 increases, hence turning U5 off and thus reducing the DC supply voltages to the IF amplifiers. This in turn reduces the IF gain. The level at which the AGC threshold occurs is determined by variable resistor R13. Transistor U23 matches U5 and compensates for changes of it's VBE with temperature, which ensures stable operation of the circuit over a wide temperature range.

It is important to note that the circuit is arranged such that transistor U7 always turns off before U6, thus ensuring that the AGC action is progressive and that a 60dB dynamic range is achieved.

The output from U3 is matched by a PI attenuator formed with R15, R16 and R17, which is coupled to transformer L9 tuned to the IF frequency by C21. The transformer has an impedance ratio of 1:16, which matches gate-1 of the dual-gate MosFET buffer amplifier U8.

U9 is an advanced low-power Schottky hex inverter IC and forms the heart of the demodulator. Two of the gates are linearised by the feedback arrangement of r23, R24, R26 and R27. The first gate acts as a small signal amplifier, and the second limits at TTL logic levels. Potentiometer R26 adjusts the sensitivity of the limiter amplifier.

The demodulator is based on the Travis principle. the output of the limiter amplifier, which is at TTL levels, drives two gates. Each of these gates drives a tuned circuit, one is tuned to 33MHz and the other to 47MHz. Both tuned circuits are coupled to positive and negative peak-level detectors,

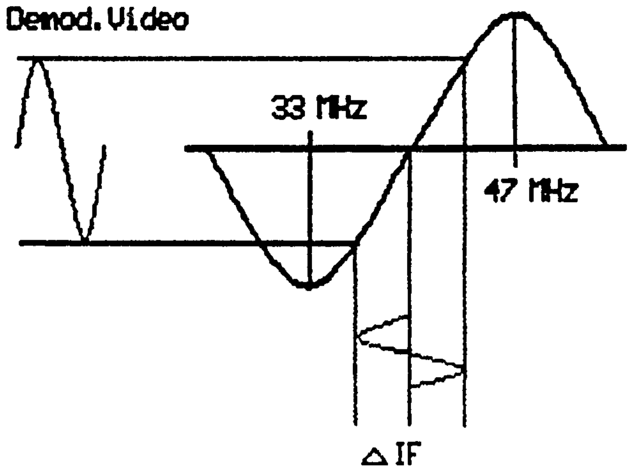


Fig.2 Principle of operaration of a Travis Demodulator.

diodes U12 and U13 respectively. The outputs from these detectors are applied to R36 where the signals are combined. The balanced output is then DC coupled to emitter follower transistor U14.

The principal of operation of the demodulator is shown in Fig.2. the combined outputs from the tuned circuits form a familiar demodulator 'S' curve, and the linear slope between the two peaks is used to demodulate the IF signal.

After demodulation the output from U14 is applied to a video filter, audio subcarrier demodulator and AFC output stage. The video filter comprises components C38, C39, C40 and L13, and has a bandwidth of 12MHz. As the audio subcarrier is within the video bandwidth, C41 and L14 form a trap to filter it out. The response of this filter is shown in Fig.3.

After filtering the video signal is applied to the video amplifier U15, which has two available outputs, normal and inverted. Switch S1 is used to select the desired output and couple it to a standard CCIR de-emphasis circuit via emitter follower transistor U16. The de-emphasis circuit consists of components R50 to R53, C48, C49 and L16. R49 and R54 match the input and output of the circuit. Following de-emphasis the video signal is finally amplified by transistors U17 and U18 to provide a 1V peak-to-peak output into 75-ohms, which is available at the PCB-mounted phono socket.

An automatic frequency control signal is made available at pin-4 of the 5-pin PCB-mounted DIN socket. This signal is derived at the junction of C42 and R42, where the capacitor strips off the video to leave a DC component which is proportional to the IF signal frequency.

As mentioned earlier, the emitter follower transistor U14 has an audio subcarrier output. This is coupled to ceramic filters M5 and M6, which are connected to pin-1 of IC U24. This device is the well known TDA3190, which has a limiter amplifier, demodulator and audio amplifier all in a single package. L17 and C60 are part of the quadrature detector and are tuned to the audio subcarrier frequency of 6MHz.

The demodulated audio is controlled by a DC level control (volume) circuit within the IC. External control to this circuit is effected by R67, which is connected between to pin-5 of the PCB-mounted 5-pin DIN socket. A 10k variable resistor connected between this pin and ground (pin-2) enables adjustment of the audio level from 0 to 1W. The audio output is available at pin-4 of the 4-pin PCB header socket.

BENCH TESTS

The following test equipment was used to carry out the laboratory tests:

Marconi 2383 Spectrum Analyser and Tracking Generator

Philips PM5646 Television Pattern Generator

Philips PM3226 Oscilloscope

Philips CM8833 Colour Video Monitor

Fluke 8050B Digital Multimeter

Racal Dana 9232 Bench Power Supply

The review unit came fully aligned, so my initial bench tests were to apply an IF signal at 40MHz nominal carrier frequency, modulated with a Philips PM5534 test card, from the Philips TV Pattern Generator. The resultant demodulated output waveform was then viewed on the Philips oscilloscope. The results obtained showed a correctly restored composite video signal with no discernible distortion. This signal was then displayed on the Philips video monitor and compared with the source signal from the pattern generator, again there was no discernible difference.

A 1kHz modulated 6MHz audio subcarrier was then modulated onto to the IF signal and the audio output from the IF unit terminated in 8-ohms and the waveform viewed on the oscilloscope. At very generous levels of audio from the unit the distortion measured on the demodulated 1kHz signal was less than 2%, and only

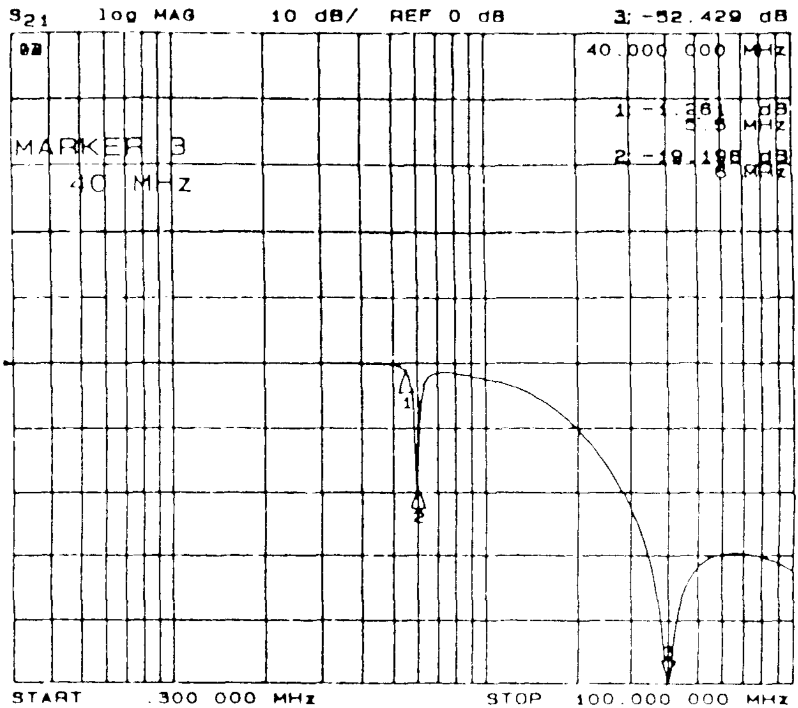


Fig.3 Video Filter response.

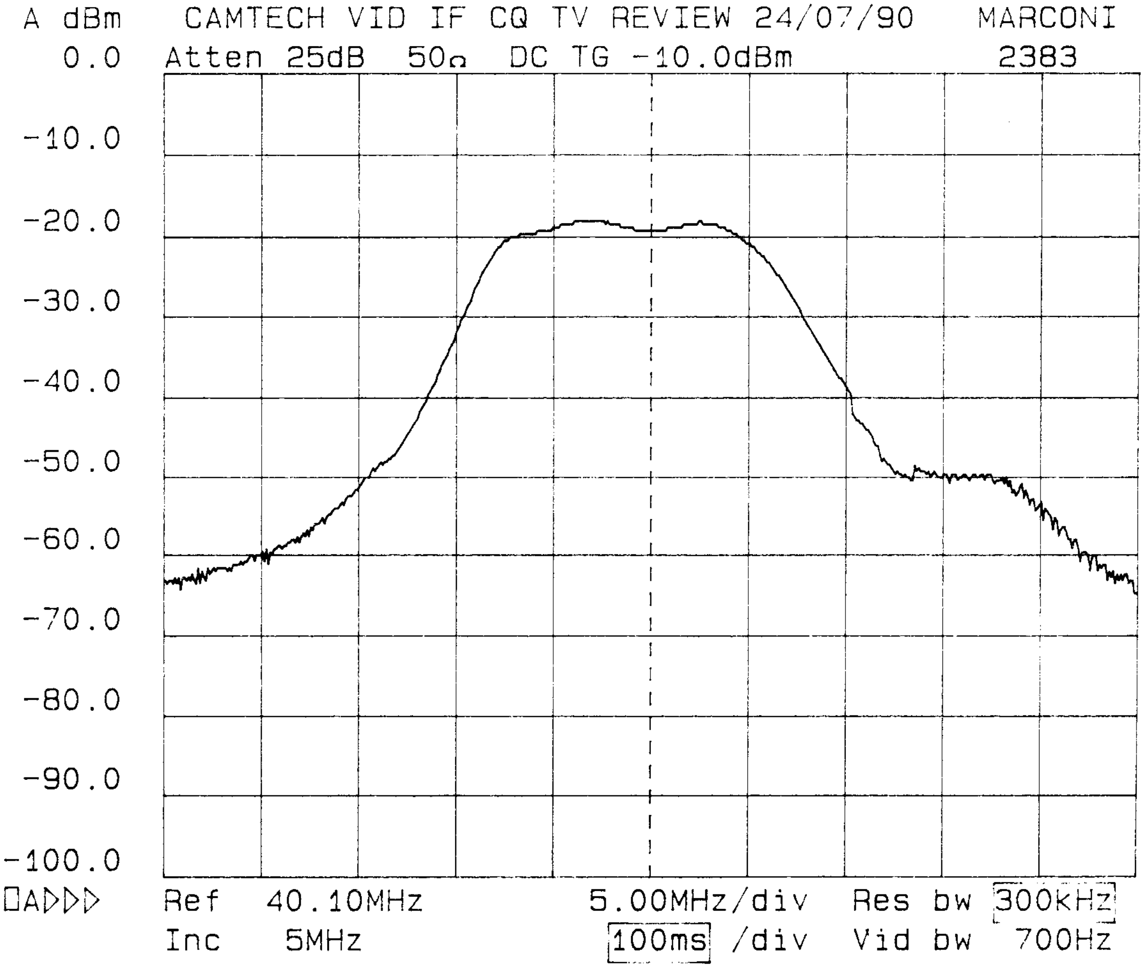


Fig.4 Video IF Filter response.

reached 3.2% at full output. There was no apparent disturbance to the video waveform at all levels of volume up to approximately 75% of full output, and then only minimal picture disturbance at higher volume levels. It must be stated here that at with normally modulated audio subcarrier levels a volume setting greater than 50% was far too much for comfortable listening.

After conducting the above tests I then proceeded to detune the complete unit in order to align it according to the instructions included. The manufacturer states that all that is required to align a unit is an oscilloscope, a multimeter, a 30 to 50 MHz signal source and a 12V DC power supply rated at 0.5A minimum.

If a 30 to 50MHz signal source is not available a circuit is included in the instructions for building a simple FET Colpitts oscillator signal source, which can be tuned to the required frequency by listening to the harmonics on a domestic VHF FM radio. Whilst I did not use this method I have no doubt that it will work quite satisfactorily if the method has to be used. The circuit diagram of the test oscillator is shown in Fig.5.

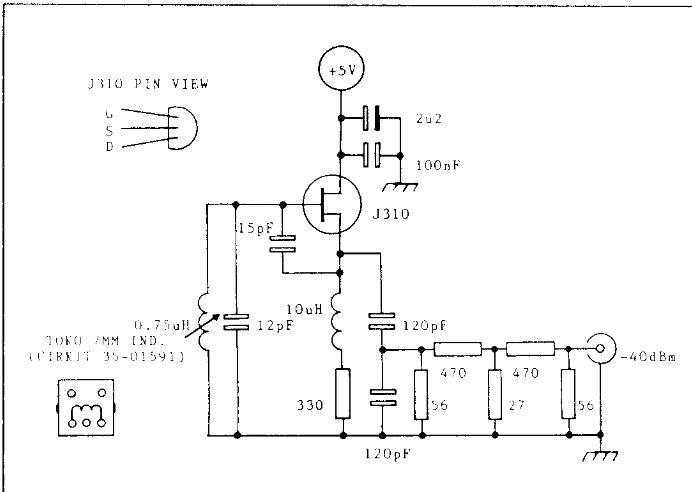


Fig.5 Alignment Test Oscillator.

Following the instructions given implicitly I realigned the review unit and the carried out the original bench tests a second time. The results obtained, to all intents and purposes, were identical.

Having satisfied myself that everything was working correctly again I then plotted the response of the input IF filter and the result is shown in Fig.4. This matches very closely the response curve shown in the accompanying literature from Camtech.

A plot of the video filter was attempted next, but due to a failure of the testing equipment an actual printed response was not possible. However, the response noted on the screen of the Spectrum Analyser was again very similar to that shown by the manufacturer.

The power requirements of the review unit were approximately 190mA with no audio output and up to a maximum of approximately 350mA with full audio output. The supply voltage was varied from +15.0V to +12.0V with no effect on the signals.

With the supply voltage below +12V it became obvious that the on-board regulation circuits became inoperable, and the output waveforms deteriorated until at a DC supply voltage of around 10.75V the unit became unstable.

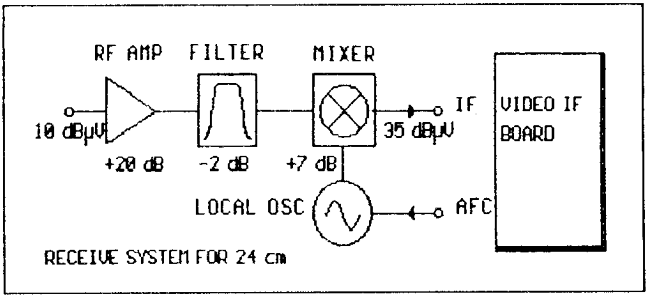
Camtech suggest a DC supply voltage of +12V, however, my recommendation is to supply the unit with the normal regulated shack voltage of +13.5V for efficient working.

This completed the bench tests, it was now time to put the Video-IF board to the real test! Off air.

OFF AIR TESTS

Obviously the only way to air test the VIDEO-IF board was to include it in a 24CM FM amateur TV receiving station - mine! That said and done I had to convince myself that tearing apart a perfectly usable receiving system was a good idea. Psychology aside, my receiving system is also the regulation monitoring receiver for GB3RT (the Rugby Television Repeater Group's 24CM FM ATV repeater sited at Coventry), and to have it off the air for long could prove embarrassing.

Anyway, I duly ripped out my trusty old BATC demodulator and my home-brewed audio demodulator and installed the review unit in its place. That was the easy part! My Wood & Douglas 1250DC50 24CM receiver outputs its IF at 50MHz - the Camtech VIDEO-IF board expects its IF input at 40MHz. What's 10MHz you say!



RECEIVE SYSTEM FOR 24 cm

The answer, of course, was to adjust the local oscillator in the W&D receiver to give an IF of 40MHz. This proved not too difficult to do, although it is certainly easier to do if you have an SHF Signal Generator and a Spectrum Analyser available.

With other receive converter systems utilising a TV tuner as the second IF stage it may be possible to adjust the IF output of the TV tuner from its nominal 35MHz to 40MHz by tweaking the local oscillator with additional capacitors. If anyone reading this has the answer please write and let me know so that I can publish the details.

So, having realigned my W&D receiver I was now able to receive signals through the review unit. Initially I used the transmissions from GB3RT, which transmits near the top of the 24CM amateur band at 1318MHz. The pictures I receive from the repeater are P5 (broadcast quality - noise free) through my normal system, but I do suffer at times from a very large radar interference signal from Clee Hill radar, which is on the same beam heading for me as the repeater.

With the review unit in use the quality of the received pictures appeared to have nominally a little better definition to them, although this is of course totally subjective and within the eye of the viewer. However, the one overriding improvement was the virtual total lack of radar interference. Having satisfied myself that the radar pulses were still there by asking other stations, I tuned around either side of the GB3RT signal and yes there the radar was, where it should be around 1305MHz. The pictures from GB3RT though were almost entirely interference free. So it seems that the combination of the input IF filter and the fast-acting AGC of the Video-IF are certainly giving results which are a vast improvement over my old BATC system.

Next, I swung the aerial northwards towards Leicester and the amateur TV repeater GB3GV. Signals from this 'box' I normally receive at around P3 to P4, with non-existent audio. With the review unit installed there appeared to be a little more noise on the received picture, but Lo and Behold, there was audio. Albeit low and noisy, but audio all the same. Thus, again the IF selectivity exhibited by the input filtering stage was again giving overall improved results.

The final off air test were conducted receiving signals at the lower end of the

band, at around 1249MHz. I expected there to, be no change in the results obtained, as the only real difference was the input frequency to the receiver, not the IF board. All the signals received were of at least the same quality as with my old system and in most cases somewhat better.

CONCLUSIONS

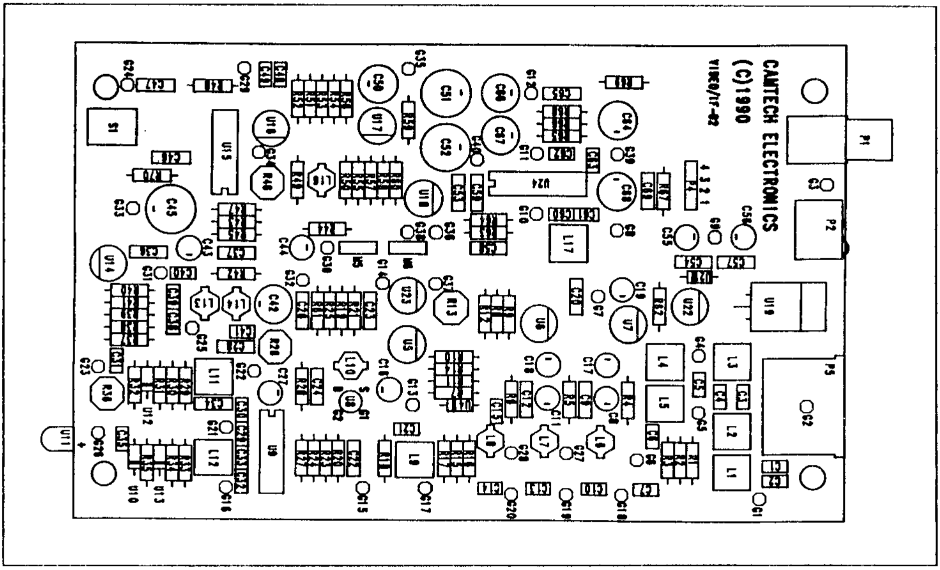
It is hard to actually find anything I do not really like about the unit. The DC input connections initially on the review unit left a lot to be desired, the inexperienced would have found it simplicity itself to virtually destroy the board. However, Camtech have taken my advice and are now fitting the DC socket mentioned earlier.

The choice of an input IF frequency of 40MHz also seemed a little odd, considering that, in the main, most receive systems aim for an IF output of 50MHz, or in the case of the BATC home-brew designs 35MHz. The technical reasons for choosing this IF frequency are very sound, but still awkward. However, a little Camtech bird tells me that a matching 24CM receiver is on the way. Watch this space!

I find it odd that not only Camtech, but most of the Video world as well, seem to think that phono sockets are a must for video connections. Perhaps I find it odd because I never normally use them - I prefer BNC's. The use of a DIN socket for the IF and AGC interconnections also seemed odd. OK, I can see the production advantages, but DIN plugs are for audio - aren't they? Obviously it must be me set in my ways, because in no way does the choice of input/output connectors appear to affect the operation of the unit, it's just that I never seem to have the appropriate adaptors!

All in all, I found the Video-IF unit easy to align and use, and the results obtained were, generally, an improvement over my previous, one time state-of-the-art (Ark time that is!), FM ATV receive system.

The Camtech Video-IF unit is available from Camtech Electronics, 21 Goldings Close, Haverhill, Suffolk, CB9 0EQ. Tel: 0440 62779. Fax: 0440 714147. The cost is £79.95 + VAT for the kit, or £99.95 + VAT for the built and aligned unit. Both prices are plus postage and packing.



LOGIC CIRCUITS

Part-7

John Wood G3YQC

In describing logic circuitry it is often necessary to differentiate between 'Q' outputs (non-inverted) and 'Not-Q' or 'Bar-Q' outputs (inverted) of various ICs. It is usual to put a little bar, or minus sign over the letter Q to mean Not-Q, but for technical reasons in the production of printed text this character is not always available to the author. Such bars must therefore be inserted by hand on the finished printers copy, but this introduces the possibility of producing errors in the text by simply forgetting to do it. For this reason, I shall henceforth refer to an inverted Q output as 'not-Q'. Similarly other expressions such as powers etc may also be written in long form.

SHIFT REGISTERS

Basic system

The shift register has beeen mentioned in passing in this series but no details have been given as yet. Basically, a shift register consists of a chain of bistables with inputs and outputs connected and with commoned clock pulse inputs. Fig. 1 shows a typical shift register composed of D-type bistables, but any sort of bistable may be used. This is then a shift-right register.

There are several types available in the TTL range and they have various features such as 4 bits, 5 bits, 8 bits etc, or shift left instead of, or as well as, shift right, parallel loading, etc, etc. Table-1 shows features of many of those in the range.

Shift registers are used mainly in two ways. Firstly as a means of delaying pulses by fixed increments, and secondly as a temporary store of digital information. The first application is the one commonly used for TV purposes, whereas the second one is mainly for computers or calculators and will not be described here.

Some shift register ICs will now be described and ways in which they can be used will be given.

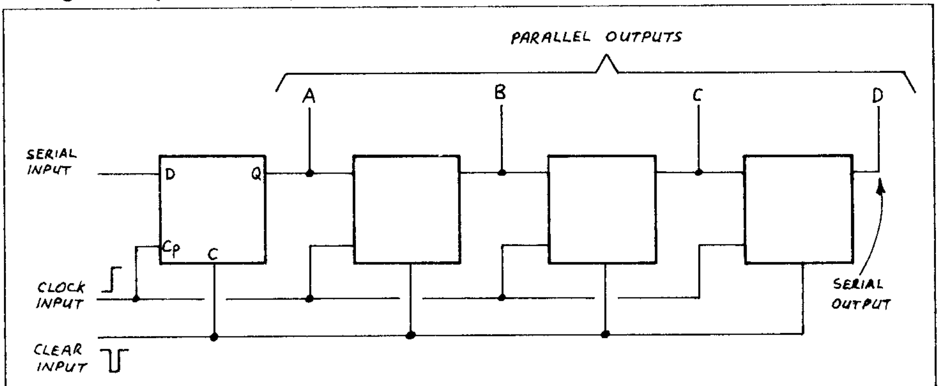


Fig. 1 A typical Shift Register

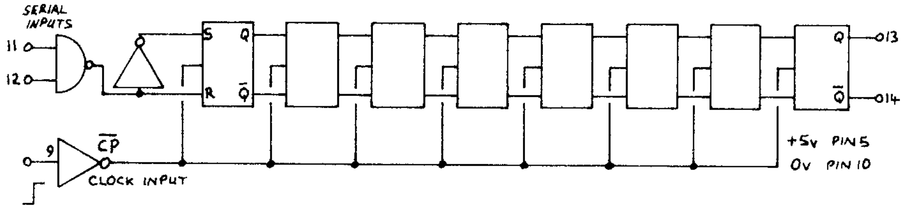


Fig. 2 Block Diagram of the internal structure of a Shift Register

Table 1 FEATURES & FACILITIES OF VARIOUS TTL SHIFT REGISTERS

Type	No. Pins	No. Bits	Input	Output	Shift	Clear Input	Preset Enable	Clock	Mode
7491	14	8	ser. 2 off	ser. Q & $\overline{Q}$	right	no	no	pos	no
7494	14	4	ser. par. (2)	ser. Q par.	right	pos	(2)	pos	no
7495	14	4	ser. & par.	ser. Q & par.	right	no	with mode	pos (2)	yes
7496	16	5	ser. & par.	ser. Q & par.	right	neg	yes	pos	no
74164	14	8	ser. (2)	ser. Q & par.	right	neg	no	pos	no
74165	16	8	ser. & par.	ser. Q & $\overline{Q}$	right	neg?	with load	neg (2)	yes
74166	16	8	ser. & par.	ser. Q	right	neg	no	pos (2)	yes
74194	16	4	ser. (2) & par.	ser. Q & par.	left & right	yes	no	pos	yes
74195	16	4	ser. & par.	ser. Q &$\overline{Q}$ par	right	yes	no	pos	yes
74198	24	8	ser. (2) & par.	ser. Q & par.	left & right	neg	no	pos	yes
74199	24	8	ser. & par.	ser. Q & par.	right	neg	no	pos	yes

ser. = serial, par. = parallel, pos = positive, neg = negative

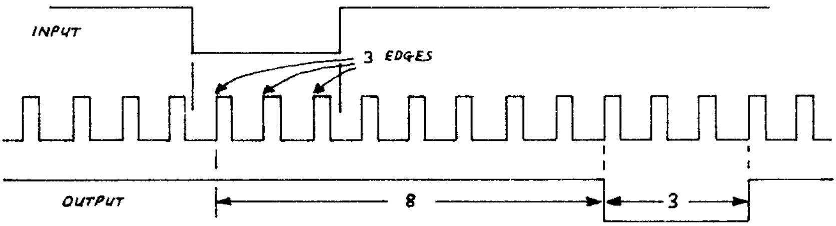


Fig. 3 Typical Shift Register waveform

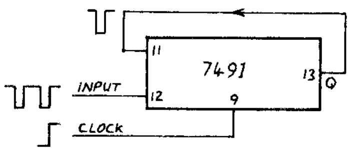


Fig. 4 Ring Counter

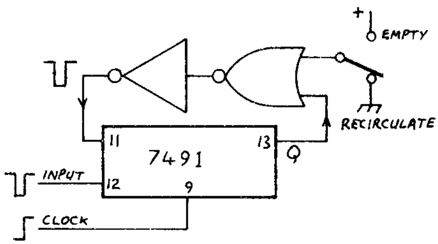


Fig. 5 Ring Counter

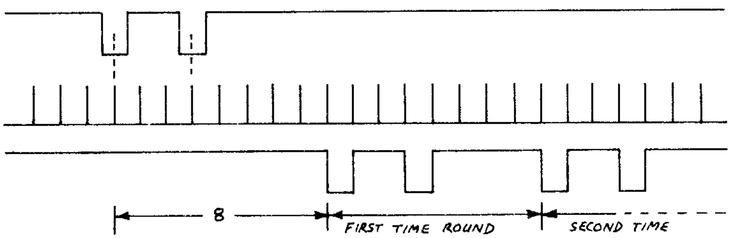


Fig. 6 Ring Counter Waveforms

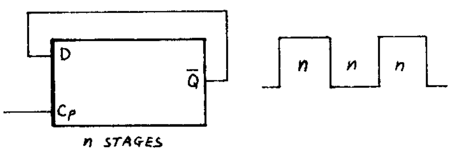


Fig. 7 Twisted Ring Counter

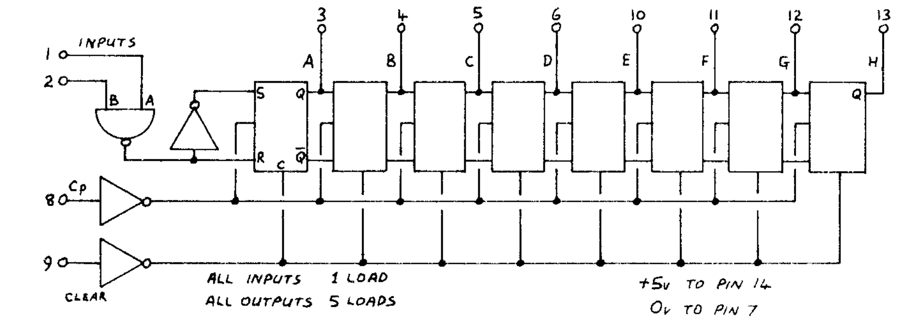


Fig. 8 Delay Line

SN7491

Delaying of pulses is the only use for this type as it has no access to the various bistable outputs except for the last one - the serial output this is known as. There are 8 bistables which can hold 8-bits of information. (A bit is one state at any one time, either 1 or 0). The 7491 is thus the simplest shift register available. Fig. 2 depicts the internal circuitry in block form and Fig. 3 the waveform for a typical application in which a pulse is delayed by 8 clock pulses.

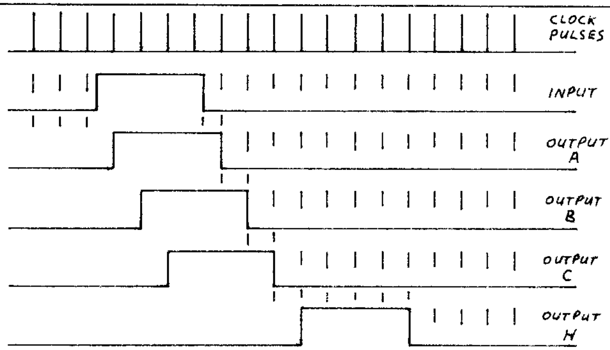


Fig. 9

It will be seen that the input pulse straddles three clock pulses (only the positive-going edges perform the clocking). The output pulse will thus be exactly 3 clock pulses in duration with a delay of 8 clock pulse periods. Obviously, if the frequency of the clock is varied then the delay will also vary. The width of the output pulse will also become more accurate as the period decreases.

Ring Counter or Re-circulating Store

The 7491 can be used as an 8-bit ring counter if the output is connected to the input. The free input can be used to insert a pulse train. Unfortunately, the contents of the register can only be cleared by feeding in 8 successive zeros or by opening the loop. See Fig's 4 and 5. Fig. 6 shows the waveforms for the re-circulating store.

Twisted Ring or Johnson Counter

Another use for the shift register is to make a divide-by-sixteen counter. To do this an inverter is included in the feedback loop, or the not-Q output used. Fig. 7 shows the system.

The 7491 is of no use if more, or less, bits of delay are required

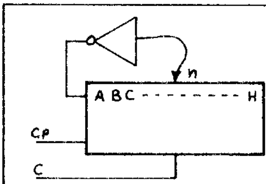


Fig. 10

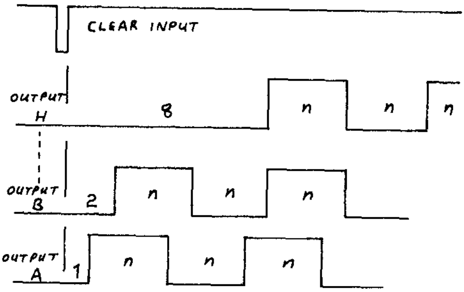
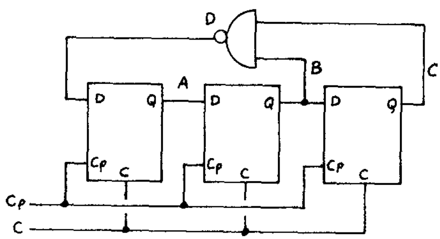


Fig. 11



$$2n - 1 = 2 \cdot 3 - 1 = 5$$

Fig. 12 Synchronous Counter

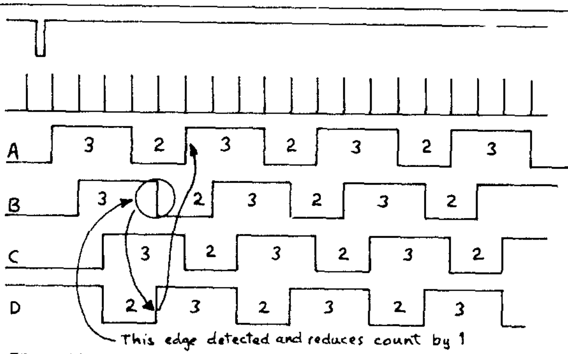


Fig. 13

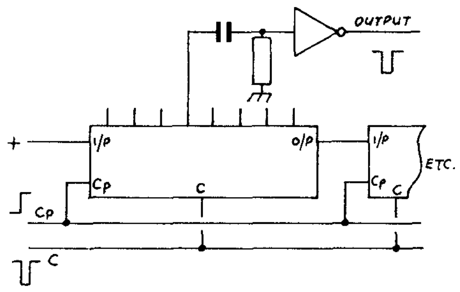


Fig. 14

and so the next logical development is a shift register with each bistable output available. This type has parallel outputs.

SN74164

The system for this device is basically the same as for the 7491 but there is a common clear input as well which sets ALL

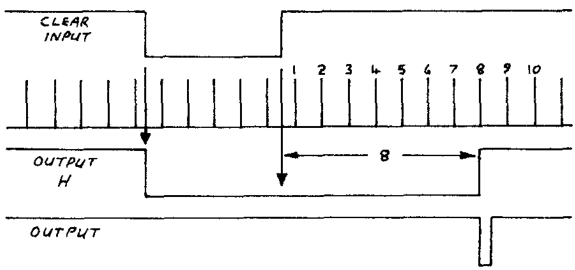


Fig. 15

bistables to Q-low. 1 The 8 outputs enable the register to be used as a delay-line with tapping points and Fig. 8 shows this.

There is no not-Q output in the 74164 so for a twisted-ring counter an inverter is necessary. If the last output is used there will be an 8-period delay before the waveform goes high no matter where the feedback connection is. The count is 2 times n whereas the count of a ripple chain of bistable would be 2 to the power of n.

The count can feedback information. This operates by detecting the start of the n'th period to produce a high for the input bistable one period sooner than it would normally have come. This shortens the count by 1. The counter is synchronous. See Fig. 12.

There is another sort of counter that can be made from a shift register and this is known as a linear shift register generator counter. This will be described later on in this article.

Pulse Generation

For television purposes perhaps the main use of the shift register is in sync pulse generators as a source of line pulse edge-timings.

In this application the register is cleared at the twice-line rate and then clocked by, say, 10MHz pulses to provide increments of 100nS. The appropriate timings can then be simply obtained by tapping along the register outputs.

There are two methods of generating the pulses which run along the register. Firstly, using trailing edges; the pulses are all of different durations which makes the following circuitry more complicated because edge detectors are necessary. The second way is to generate a single pulse which is more elegant. The following circuitry can then contain R-S bistables. Fig's 14 to 17 show the system.

Fig. 18 shows how the latter system can be used in an S PG. The output pulses are

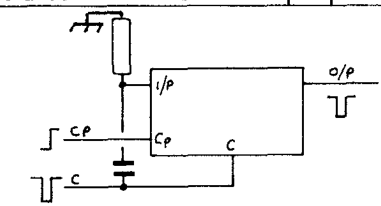


Fig. 16

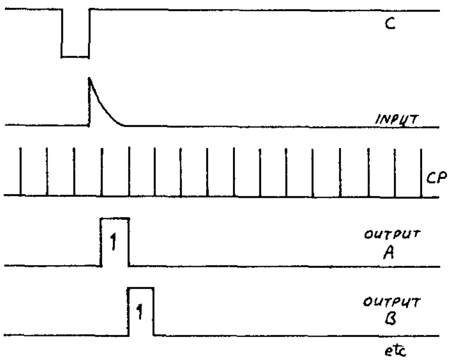


Fig. 17

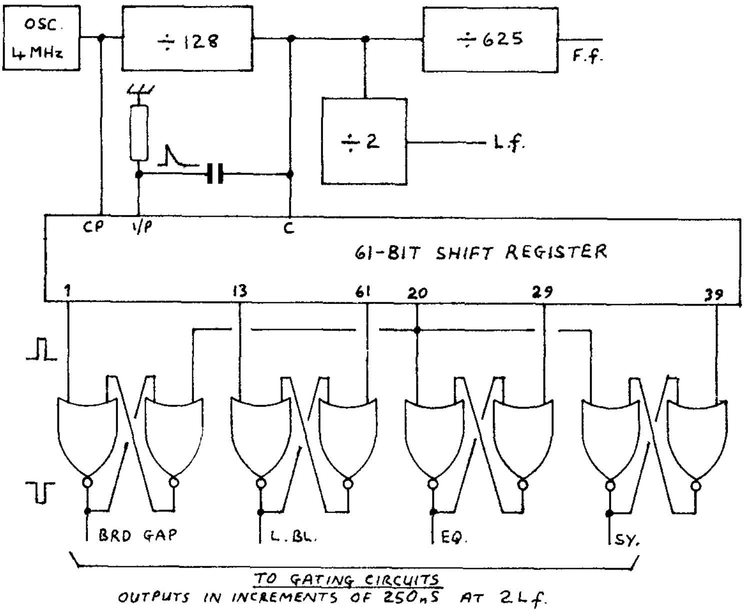


Fig. 18 Sync Pulse Generator

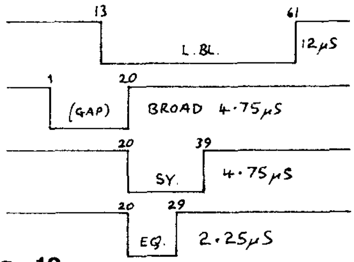


Fig. 19

all of the same width. Whilst this method is precise, it is also expensive and it is possible to cut down on the number of bits required by careful choice of the increments between the pulses. This, of course, modifies the oscillator frequency and the divider chain count.

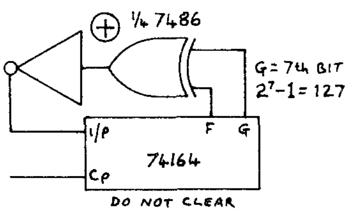


Fig. 20

The choice of suitable increments is a subject on its own and will not be discussed here. However, it is possible to meet the timing specification for 625 monochrome pulses with only fifteen bits and the 625 colour pulses with twenty. The advantage of such a shift-register timed SPG is of course that there are no controls and nothing to vary.

Linear Shift Register Generator Counters

Shift registers can be used to make a maximum length counter. This is a counter of 2 to the power n minus 1 and for a four-bit counter would be fifteen. Fig. 20 shows an example of how a maximum count is obtained - this one being 127.

The feedback is obtained via an Exclusive-OR gate 7486 with an invertor. The condition when F and G are both zero gives zero output from the 7486 and this is the state NOT included in the count of 127. The waveform is shown in Fig. 21 and is really rather dreadful.

This is all very well, but what is really wanted is an output of only one pulse in every 127. Fortunately, this is easily done by decoding the shift register outputs with a seven-input NAND-gate as in Fig. 22.

However, even this does not give quite the right output as the pulse obtained is the first of the 127. What is really wanted is the last and this can be got by substituting the Exclusive-OR output for the last shift register stage.

There is also a non-maximum length counter in which some of the count states are omitted to make any count less than 2 to the power n minus 1. This is a complicated business and the reader is advised to refer to suitable textbooks or the manufacturer's literature.

This fairly well describes the uses of the shift registers 7491 and 74164 but the principles apply to other shift registers. Two more common useful ones are now briefly described.

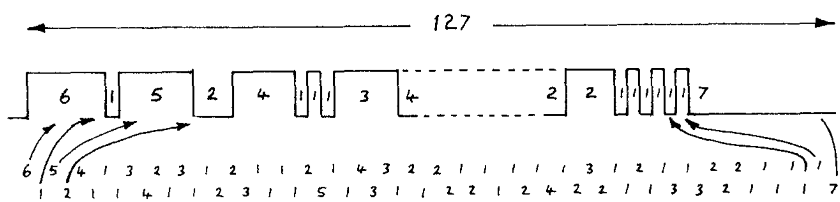


Fig. 21

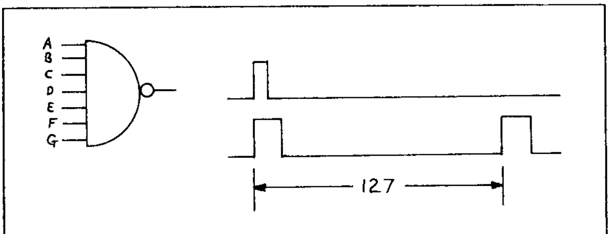


Fig. 22

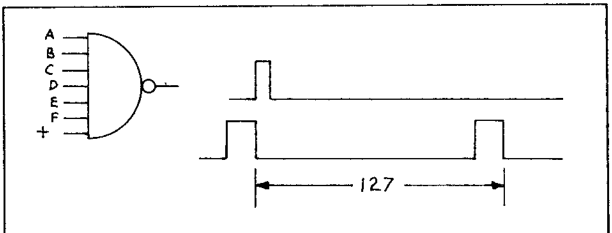


Fig. 23

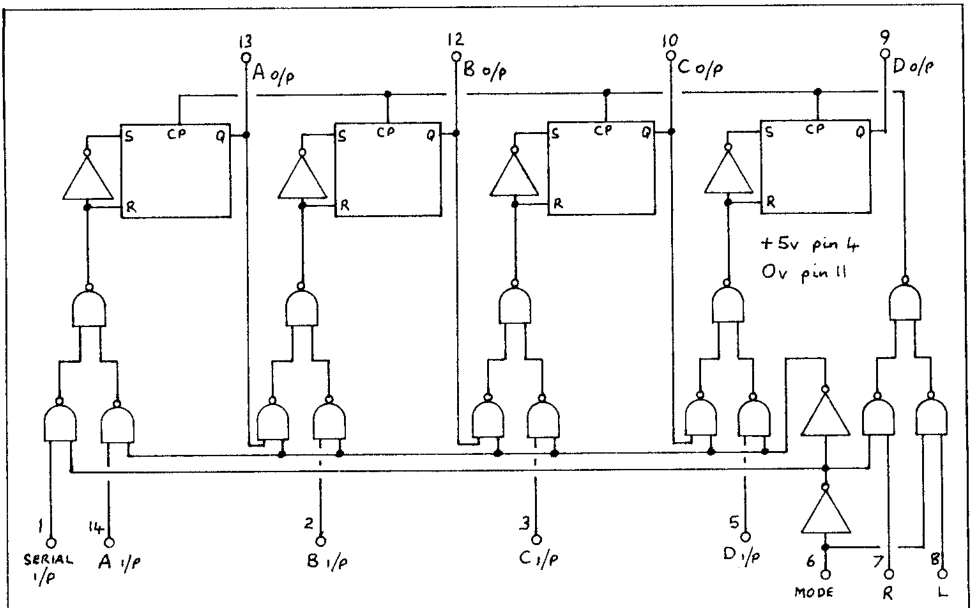


Fig. 24 SN7495 Shift Register

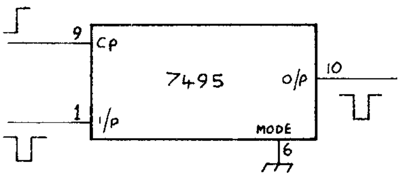


Fig. 25 SN7495

SN7495

This is a four-bit shift register which is more suited to arithmetical uses than to TV work. It has a right shift only but does have parallel loading inputs. To use the 7495 as a shift register the mode input must be made low. See Fig's. 24, 25 and 26.

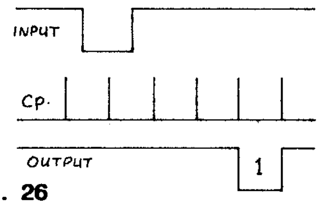


Fig. 26

SN7496

This is a five-bit shift register with parallel inputs and outputs. It has sixteen pins. Fig. 27 shows the basic details.

Fig. 28 shows how the 7496 may be used to obtain pulses of up to five clock-pulse periods in duration (plus the time to clear). If single width pulses are required then the arrangement of Fig. 30 should be used. Note the overlapping of the input and clock pulses - the output is of the same polarity as the input at the time of clocking.

MEMORIES

Description

A memory consists of an array of bistables such that any bistable output can be obtained by addressing that bistable by means of a unique code. For example, the 7481 is a sixteen-bit memory with the sixteen bistables arranged in a four-by-four matrix so that two, two-bit codes are needed to address one bistable. Two, two-bit codes are the same as a four-bit code which has sixteen possible combinations of four variables. The two sides of the matrix are X and Y. Thus to get at a particular bistable - say, the third in the X-direction and the second in the Y-direction - then the address code is 3X, 2Y, or A not-Q, BQ for the X and CQ, D not-Q for the Y, from a four-bit counter. See Fig's., 33 and 34.

Only one of the sixteen bistables can be addressed at any one time and at that time the Q-output of the bistable can be read out. The bistable can also be written into,

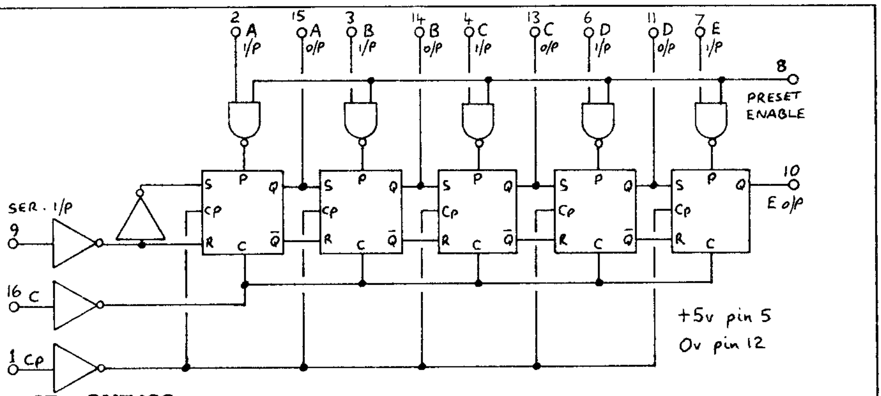


Fig. 27 SN7496

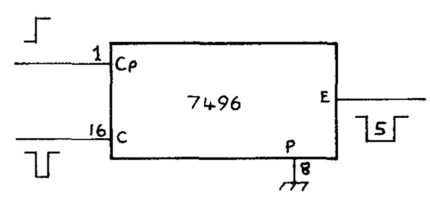


Fig. 28 SN7496

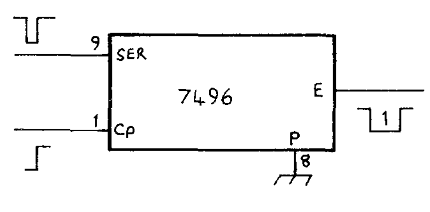


Fig. 30 SN7496

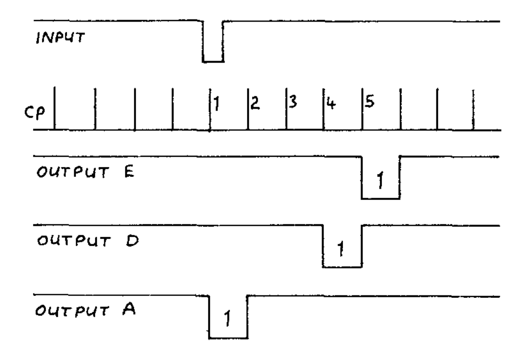


Fig. 31

which means that it can be made either Q-high or Q-low at will. No other bistable is affected during this process.

So the memory consists of sixteen independent bistables which can store sixteen bits (i.e. 1 or 0). Due to the way in which the 7481 is made, the writing input also appears at the reading output but inverted. So one cannot read whilst writing.

The 7484 also has this problem and differs

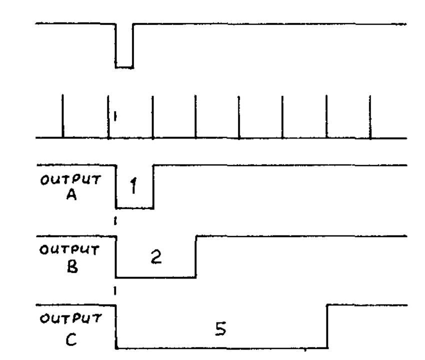


Fig. 29

from the 7481 only in that it has two extra pins which allow for two-input writing inputs. The outputs from the two bistables appear on two separate rails for the Q and not-Q outputs and these are respectively the 1 and 0 outputs. They are of open-collector type so that several memories can be wired-OR connected together to obtain a much bigger memory. The addressing code is correspondingly bigger.

Using the 7481/84

The address inputs of the four-by-four matrix are available as four X and four Y inputs so that a 1 (high) to one X together with a 1 to one Y input will select one bistable. To perform this selection from a four-bit counter needs two 7402 NOR-gates. Note that the loading of each input is 8. See Fig. 35 and waveform in Fig. 36.

Whatever state the selected bistable is in will become apparent at the read output such that the 1-output will go low if the bistable Q-output is high. The Q-output will remain high. If the Q-output is low then 1-output will remain high and the 0 output will go low. Thus the output is negative-going on one of the two rails.

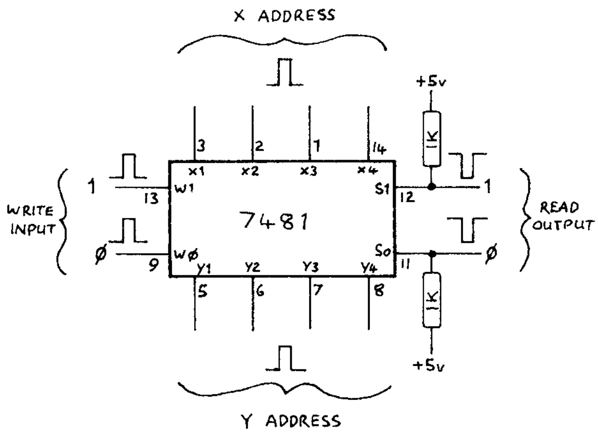


Fig. 32 SN7481

The input writing requires a high input to one, or other, of the two inputs such that a 1 to the write-1 input makes Q high. (It appears at the output 1 as a low during the writing time which stays as a low when the writing input is removed).

Thus it is possible to select all sixteen of the bistables and load them with 1's and 0's so that a pulse train is generated when the four-bit counter is made to count through its sequence.

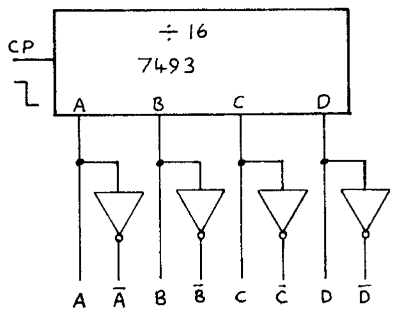


Fig. 33 SN7493

The memory can also be used to store sixteen events in a synchronous manner, for example, a waveform can be divided into sixteen parts timewise and the memory address clocked in order, thus memorising the original waveform. However this is a tricky business.

The 7481/4 is an IC which is very useful but, somehow, its usefulness does not seem to extend to television applications. Its functions can be done more easily by other means.

More on Monostables

Firstly, here is a quick method of working out the delay period, or the capacitor value required, for the 74121 monostable. If the timing resistor is made 15k (to pin-11) then the value of C in hundreds of pFgives the delay period in microseconds.

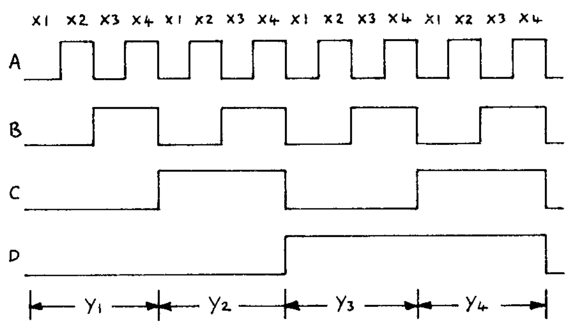


Fig. 34

The second item shows a simple way to make a dual period, switchable monostable from basic gates. The three-input gate has two time-constants feeding two, two-input

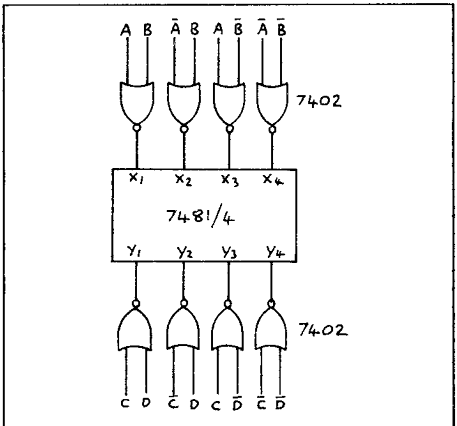


Fig. 35 SN7481/4

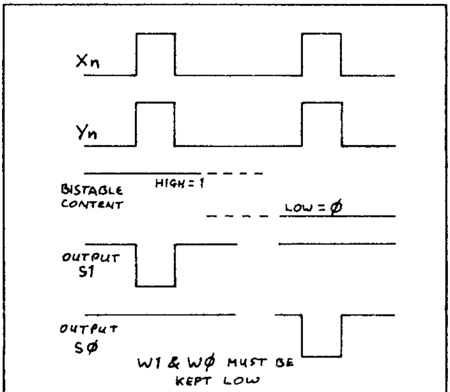


Fig. 36

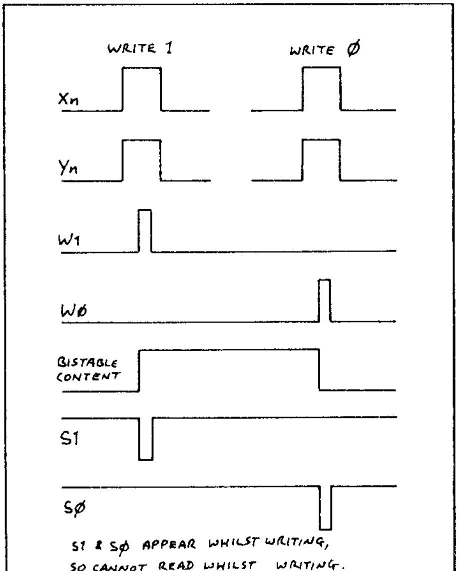


Fig. 37

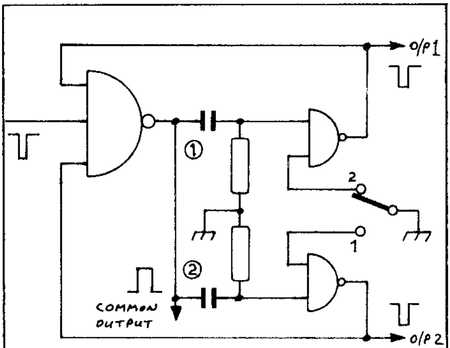


Fig. 38

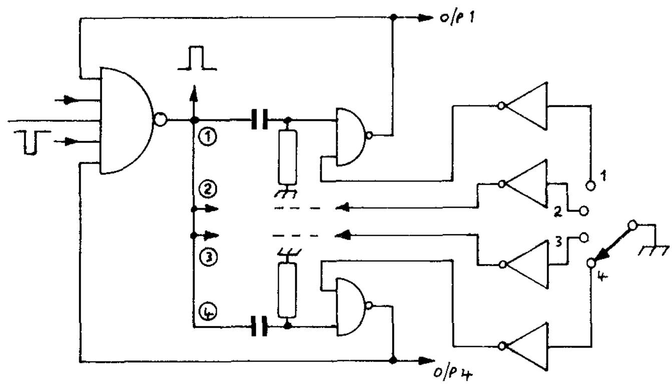


Fig. 39

Fig. 40

gates. These two are controlled by a two-way switch so that only one gate can feed back a pulse to the input gate at a time. The output of the unused gate is high and so does not stop the other half from doing so.

The principle can be extended as Fig. 37 shows but for more than two gates inverters are required and the maximum numbers of time-constants should be limited to about five because of the shunting effects of the time-constants on the first gate.

Note that as with all such simple monostables the input trigger pulse should be shorter than the desired pulse if a clean trailing-edge is required. If it is longer then the monostable will still work but the trailing-edge will be as shown in Fig. 40. The reason for this is that the feedback action is prevented from causing a snap action because the input is still low when the feedback occurs.

Next issue

The next part of this series will describe coders and decoders and their uses. Linear IC's will also be introduced.

SILENT KEY

I write to let you know of the sad news of the death of my pal W.E.Foulds G8MTF.

Ernie had been an active member on 70CM and 24CM since the early 1950's, always using home-built equipment. A full run down of his activities would take too long, but I thought that on behalf of his widow Joan I would write and let you know of his passing.

Dennis Hodges G8MSX

IN THE STUDIO

Part–10

John Goode

DERIVING KEY SIGNALS

With the type of effects-amp. described in "ITS" No.9, almost any video signal of the correct level can be used to key between two other sources; however there are some rules to be observed if the process is to work well.

Firstly, if the key signal is from a composite colour source the subcarrier should be removed, as it causes inaccuracies at the switching edges. Fig.1 shows a simple filter that will do this; it could be built into the key input of the effects amplifier itself.

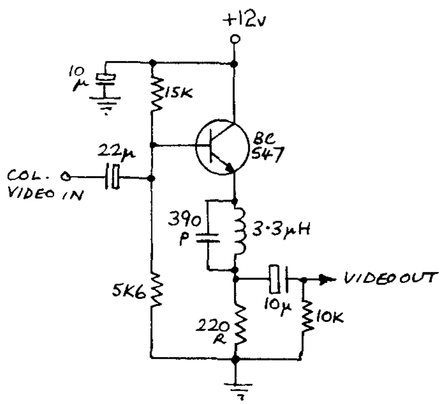


Fig. 1 Subcarrier Filter

Next comes the question of delay. With any form of key signal that is derived from one of the source signals (such as captions or chroma-key), the keying signal should not be significantly delayed with respect to the original source. In fact, because the actual keyer itself takes a short but finite time to operate (say up to 50nS), ideally it is best to have the key signal slightly earlier than the source signal, although this is not always possible without delaying the sources.

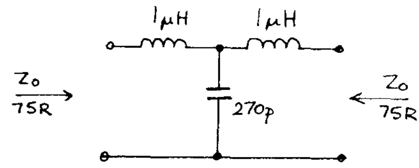


Fig. 4 25nS Delay Section (cascade as necessary)

One way to get the key signal ahead of the source is to derive the keying from the source RGB prior to encoding, if possible. An example of this would be with (genlockable) computer-generated captions and graphics that are fed to an external PAL coder. Fig. 2 shows a simple circuit for deriving a key signal from TTL RGB or IRGB outputs. With the switches as shown, the circuit provides a key output for any picture area that is not black. By operating any of the "RGB OFF" switches keying is suppressed for that primary colour. If the computer has an IRGB output, operating the "IRGB" switch will only allow keying on the brighter colours, i.e., when the I (intensity) signal is high.

If you are lucky enough to have access to a 3-tube or 3-chip camera with RGB outputs, "colour-separation-overlay" (CSO), or "chroma-keying" is possible. This technique involves shooting a foreground subject against a background of saturated colour (normally blue, but can

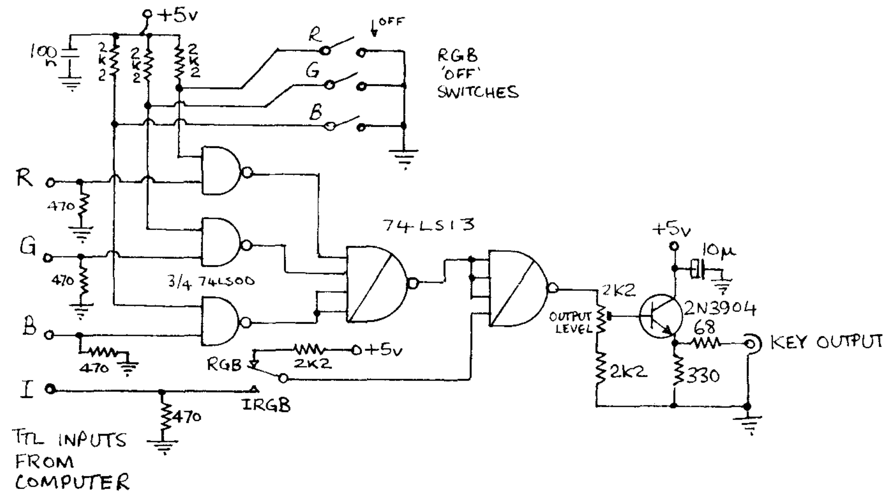


Fig. 2 Computer Keying Signal for TTL Outputs

be yellow); this area of colour is then used to key in a second picture.

We therefore require to derive a keying signal from the blue area of the camera picture. On the face of it it would seem that the Blue primary would be the required signal, but the primaries contain luminance elements as well as chrominance - all three primaries are present in white, for instance. It is better to key from the B-Y colour difference signal - by definition this is blue with the luminance removed.

It is also possible to key from yellow using this signal by simply inverting it (-(B-Y) = Y-B).

In Fig.3 I have shown a circuit for deriving keying signals from analogue RGB. As can be seen from the colour-bar waveform, the B-Y & Y-B signals are bipolar, and so a black clipper is necessary to remove the negative excursions to allow the signal to be correctly processed by the effects amp.

Depending upon the delay in the effects amp., it may be necessary to introduce a small (50-100nS) delay to the keying signal, as this is derived prior to encoding. See Fig.4. This is likely to be less if hard-keying is used, as there is a slight delay in the comparator circuit.

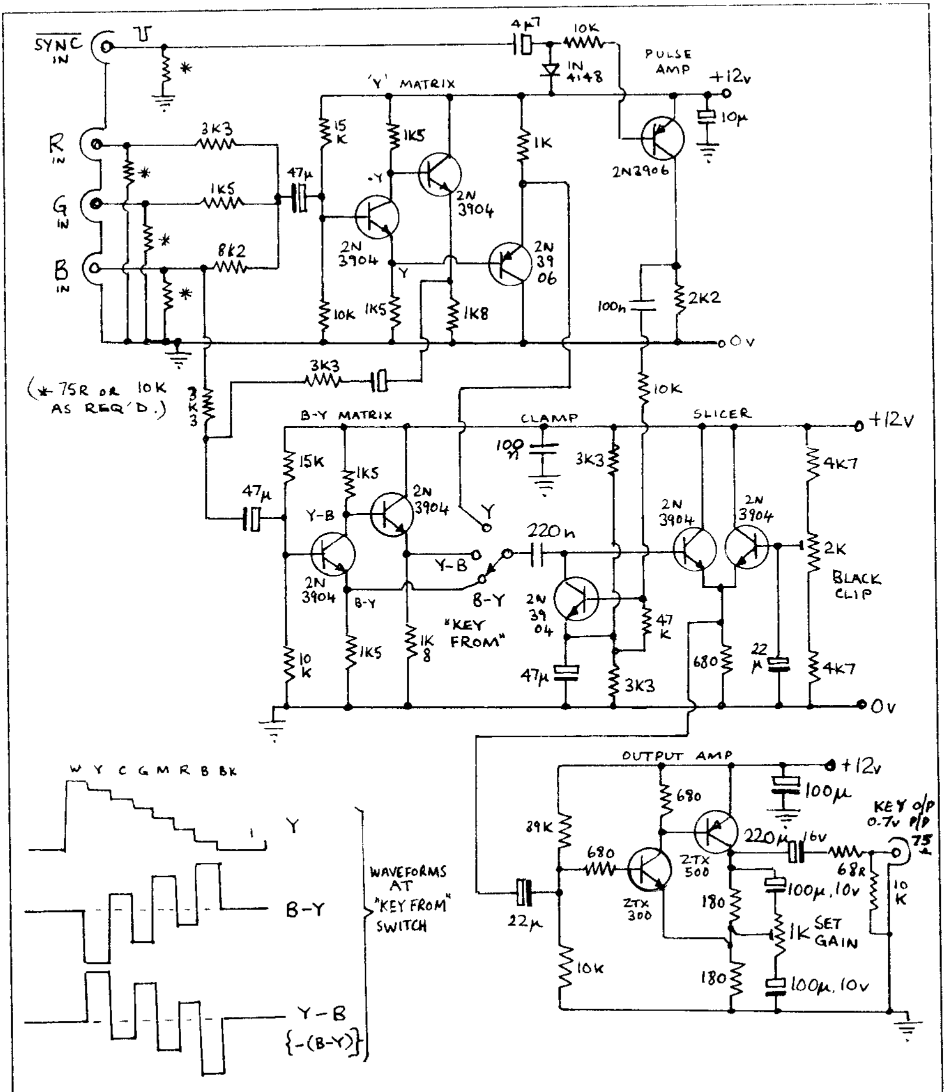


Fig. 3 Keying Signals from Analogue RGB

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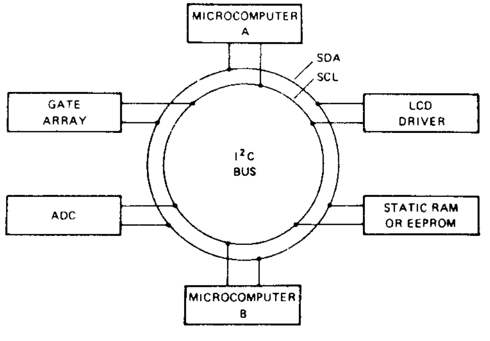

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I^{2}C Part-1 - THE VDU

INTRODUCTION

These pages are the first instalment of an I2C project book, other instalments will follow with further issues of CQ-TV, building finally into a concise reference and project book on the subject. The book will support a full construction project finalising in a complete I^{2}C unit that will control all video modules to be described in future instalments. The final unit will also control existing I^{2}C equipped commercial equipment, such as VCR's etc. So, it is well worth looking to see if that new VCR or whatever you are about to buy is equipped with I^{2}C capabilities.

The project will be backed by a set of printed circuit boards that will aid construction of the complete unit. The first PCB is available now from Members' Services, and is for the Visual Display Unit, and will generate an RGB signal that can be used to drive an RGB monitor, or can be PAL coded to provide a composite colour signal for a monitor or TV set after modulation to channel 36 or wherever). The unit will display the options menu generated by the CPU card to be described in the next instalment with the next issue. It will also display an in-built test card, teletype, or even decode and display Teletext should a suitable video feed be available.

THE I2C STANDARD

So what is it, this I^{2}C ?

I^{2}C is a two-wire serial interface, designed by Philips and used in the majority of their equipment. If you have a TV or a VCR built over the past five or six years, it will probably have some form of I^{2}C bus used internally, and this is often brought out to a socket somewhere on the equipment for external connection.

The bus was designed to allow different devices within an item of equipment to communicate with each other. The interface had to be inexpensive to implement electrically (i.e: no high-speed synchronous bit streams) and use the minimum of interconnections. I^{2}C fills all these requirements very nicely.

I^{2}C is not a particularly high-speed system, the maximum clock rate is only 100kHz. It is a serial system, so all the bits of digital information have to be sent one after the other down the same piece of wire. The system is, however, robust. It can exist inside a television set alongside the high electrical and magnetic fields that exist therein without being affected. The timing constraints are quite wide, so different devices can communicate at different speeds.

Physically, the bus consists of two wires, SDA (Serial DAta) and SCL (Serial CLock). The drivers that talk to the bus must be open-collector devices, so different chip types can all communicate on the same bus (e.g: TTL, CMOS, NMOS, etc.). Both lines should be pulled up to the positive supply rail (+5V in the case of TTL). This mechanism allows many output devices to sit on the bus together without causing any conflicts.

This arrangement is called a 'WIRED AND' function, because the outputs are wired together and will only be high if driver-1 is high, and driver-2 is high AND ...... etc. The only limit on the number of devices that can be connected to the bus is the maximum bus capacitance of around 400pF.

Before going any deeper into the way I2C works we need to understand some of the terminology used by Philips when describing a typical configuration.

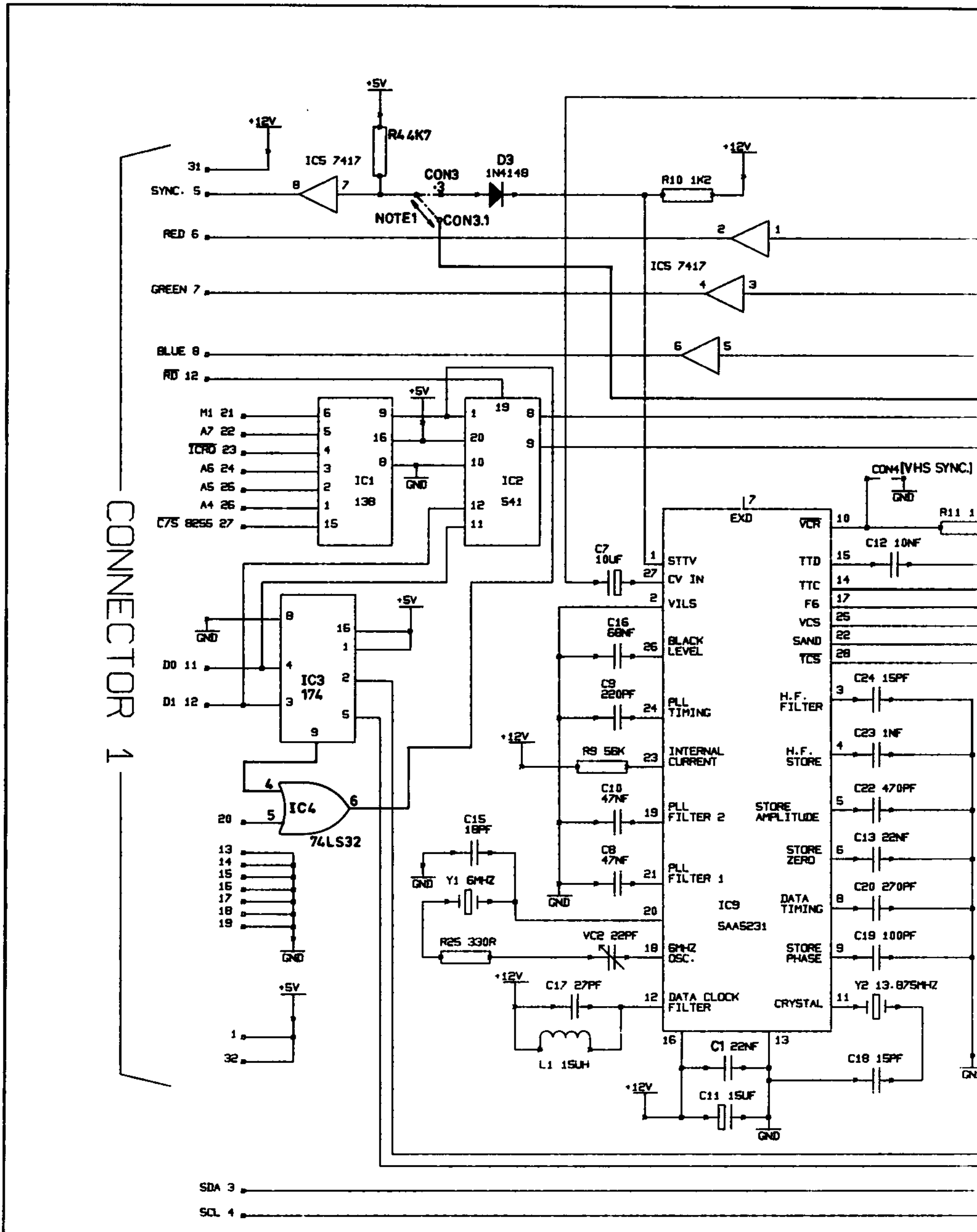
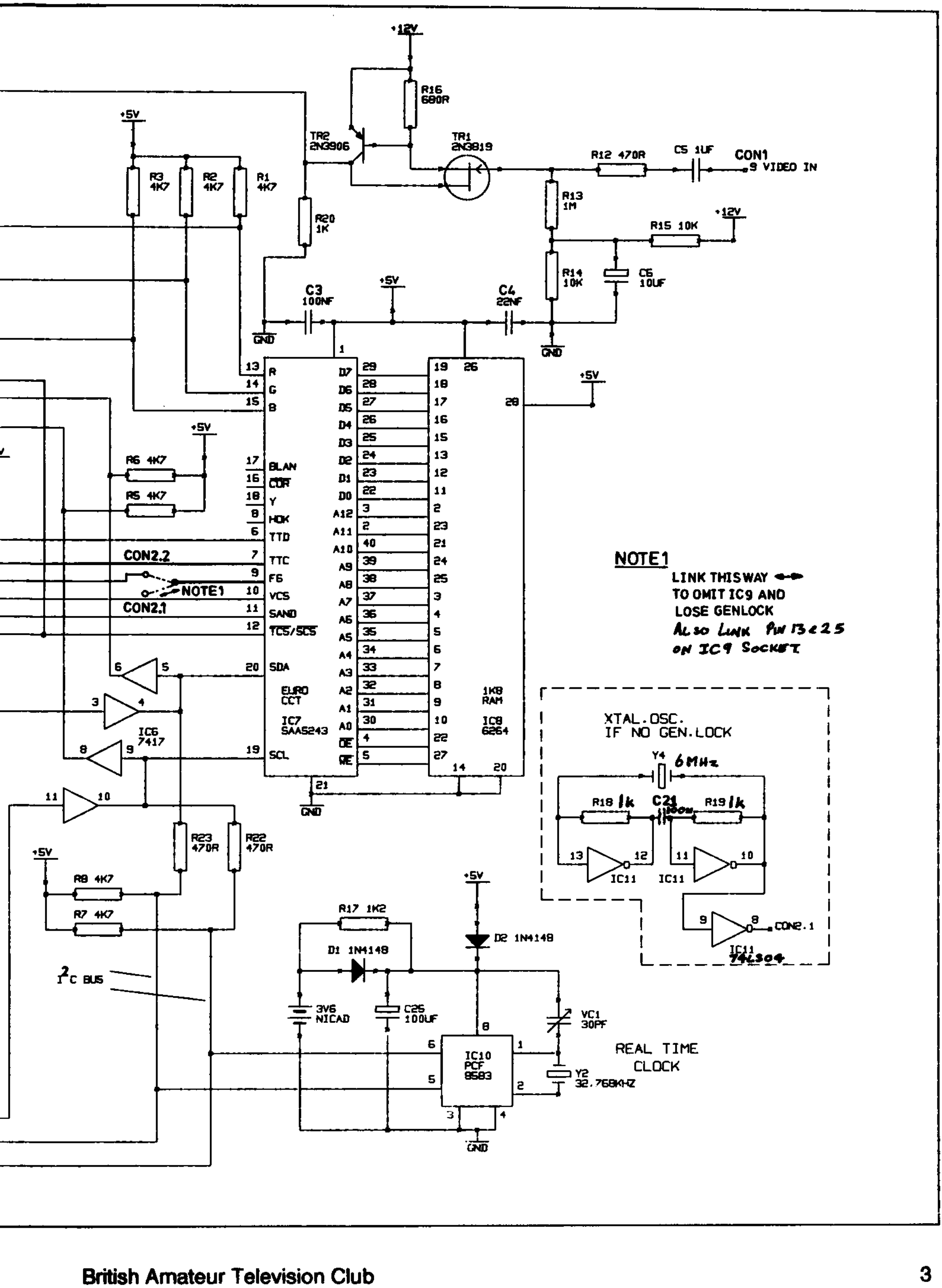


Fig.1 Visual Display Unit Circuit Diagram


+12V
R16
680R
TR2
2N3906
TR1
2N3819
R12 470R
C5 1UF
CON1
9 VIDEO IN
+5V
R3
4K7
R2
4K7
R1
4K7
R13
1M
R20
1K
+12V
R15 10K
R14
10K
C6
10UF
C3
100NF
+5V
C4
22NF
GND
GND
R6 4K7
R5 4K7
BLAN
COR
Y
HDK
TTD
CON2.2
TTC
F6
NOTE1
VCS
CON2.1
SAND
TCS/SCS
SDA
EURO
CCT
IC7
SAA5243
SCL
IC6
7417
1K8
RAM
IC8
6264
NOTE1
LINK THIS WAY
TO OMIT IC9 AND
LOSE GENLOCK
Also link Pin 13 & 25
on IC9 Socket
XTAL. OSC.
IF NO GEN. LOCK
Y4 6MHz
R18 1k
C21
R19 1k
IC11
IC11
CON2.1
IC11
74LS04
R23
470R
R22
470R
R8 4K7
R7 4K7
I2C BUS
R17 1K2
D1 1N4148
D2 1N4148
3V6
NICAD
C25
100UF
VC1
30PF
IC10
PCF
8583
Y2
32.768KHZ
REAL TIME
CLOCK
GND

MASTER: A device on the bus which starts a data transfer, generates the clock signal (on SCL) and stops the transfer when finished. The I²C bus is a 'multi-master' bus, so there can be more than one controlling 'master'. The protocol laid down in the I²C specification ensures that two masters won't collide and try to take control together.

SLAVE: The device which the master addresses.

TRANSMITTER: The device which sends data over the bus.

RECEIVER: The device which receives data over the bus.

These four terms are used a lot in describing I²C operations, and it is important that we understand what they mean.

There are four basic modes of operation on the I²C bus:

1) **The MASTER TRANSMITTER.** This is where a device will initiate a data transfer from itself to another device. The MASTER TRANSMITTER generates a 'START CONDITION' on the bus and addresses a device, that device then becomes the SLAVE READER.

2) **The SLAVE READER.** This device acknowledges the MASTER TRANSMITTER and patiently sits and gets talked at, until the MASTER TRANSMITTER decides that enough data has been sent and generates a 'STOP CONDITION'.

3) **The MASTER RECEIVER.** This is where a device will initiate a data transfer from another device to itself. The MASTER TRANSMITTER generates a 'START CONDITION' on the bus and addresses a device, when the device being addressed acknowledges the MASTER TRANSMITTER becomes the MASTER RECEIVER and receives data from it.

4) **The SLAVE TRANSMITTER.** The device acknowledges the MASTER RECEIVER and starts sending data. The transfer is not over until the MASTER RECEIVER generates a 'STOP CONDITION.

The 'START CONDITION' and 'STOP CONDITION' are two unique conditions that can only occur on the bus when a MASTER wishes to start or stop data transfer.

The 'START CONDITION' occurs when there is a high-to-low transition on the SDA line whilst the SCL line is high.

The 'STOP CONDITION' occurs when there is a low-to-high transition on the SDA line whilst the SCL line is high.

These two conditions should not occur at any other time, because the only time the SDA line is allowed to change state under normal conditions is whilst the SCL line is low.

A PRACTICAL APPLICATION

In this first practical application of I²C we will look at a design for a VDU board. This PCB contains the SAA5243 and SAA5531 Teletext chip set. The SAA 5243 is controlled via the I²C bus, and, apart from decoding Teletext information, it can display up to eight pages of information stored in an 8K 6264 RAM chip. Any of the eight pages can be updated whilst a different page is being displayed. The display is fully Teletext compatible (BBC Mode-7 graphics), thus graphics as well as text can be displayed.

The circuit is shown in Fig.1, and was originally designed to interface with the Teletron and CPU board. However, the board will also interface with the Spectrum computer.

All the I/O decoding is carried out 'on board' by IC1, IC2, IC3 and IC6. This provides an I²C bus to control the SAA5243, but the bus may be taken to other I²C devices as well. In fact, on the PCB there is another I²C device, IC10, a PCF8583. This is a clock/calendar IC and is battery backed-up so the controlling CPU now has a real-time clock facility!

The incoming video is buffered by TR1 and TR2. This is a high-impedance input, so the video may be looped or terminated into a 75-ohm resistor. The buffered video is then routed to IC9, the SAA5231. This device effectively genlocks to the video signal, synchronising all its clocks, and then attempts to extract Teletext data and clock signals from the video signal. If the applied signal contains Teletext information (i.e: from the BBC etc.) then the SAA5243 will be able to decode and display it, providing that the controlling CPU tells it to do so!

Whether the incoming video contains Teletext information or not, the board is now genlocked to the signal, and the Red, Green and Blue outputs from the SAA5243 will be in synchronisation. So, all that is required now is a PAL coder and you can really go to town - unless you have an RGB monitor that is.

Of course, the SAA5231 can be left out altogether and the SAA5243 allowed to free-run. The device will still generate RGB and sync. pulses and can then be used to generate captions, test cards etc.

If the Teletron option to control the board is taken, there is some custom software available that will allow you to display a test card, generate captions, decode and display Teletext, control an I²C vision switcher (to be described in a later part of this book) and generate I²C control signals.

This last option is possibly the most interesting. For example: if your video recorder has I²C capability how about a computer controlled VCR? There must be a good application there, especially for all you TV repeater builders!

CONSTRUCTING THE VDU

The circuit diagram of the Video Display Unit is shown in Fig.1, with a component overlay in Fig.2. The PCB is of standard Eurocard size and will accept a DIN 41612 connector. The only specialised IC's are the SAA5243 and the SAA5231, but details of suppliers of these devices will be forwarded with the PCB, which is available from Members' Services.

The SAA5231 need not be fitted to the PCB if Genlock or Teletext decoding facilities are not required. The links should be set as per the notes on the circuit diagram (Fig.1) depending on whether this device is fitted or not.

The PCB is double-sided but does not feature plated-through holes (a matter of keeping the costs as low as possible for you) so attention must be directed to those components which are to be connected to both sides of the board, ensuring that they are soldered on both sides.

Ideally, sockets should be used for all the IC's wherever possible, but choose ones that enable soldering to both sides of the PCB wherever necessary.

COMMENTS

Unfortunately, it will not, be possible to test this unit until it is mated with the CPU card to be described in the next instalment. However, do not be put off building this card until then. We need to get some idea of how many people are building the project in order to get the PCB's ordered in the correct quantity. Orders for future PCB's will be based on the orders we receive for this VDU PCB.

It is hoped that this entire project will be well supported and that the end result will be a useful addition to the shack and that the book will become a useful reference text on the subject of I²C. The whole concept has been designed to be very flexible, so that new ideas can be incorporated by simple software updates. The book is being supplied in this instalment form in order that every member receives one free-of-charge. This method will also allow the book to grow as necessary by the inclusion of extra projects and new ideas. It is hoped that the Club may be able to supply a binder for the

book at a very reasonable cost in the near future.

In the next issue we shall be describing the CPU board and running the custom software mentioned above. If you require any further information on this series, or about I2C itself, please send an SAE to Trevor Brown G8CJS, 14 Stairfoot Close, Adel, Leeds, LS16 8JR.

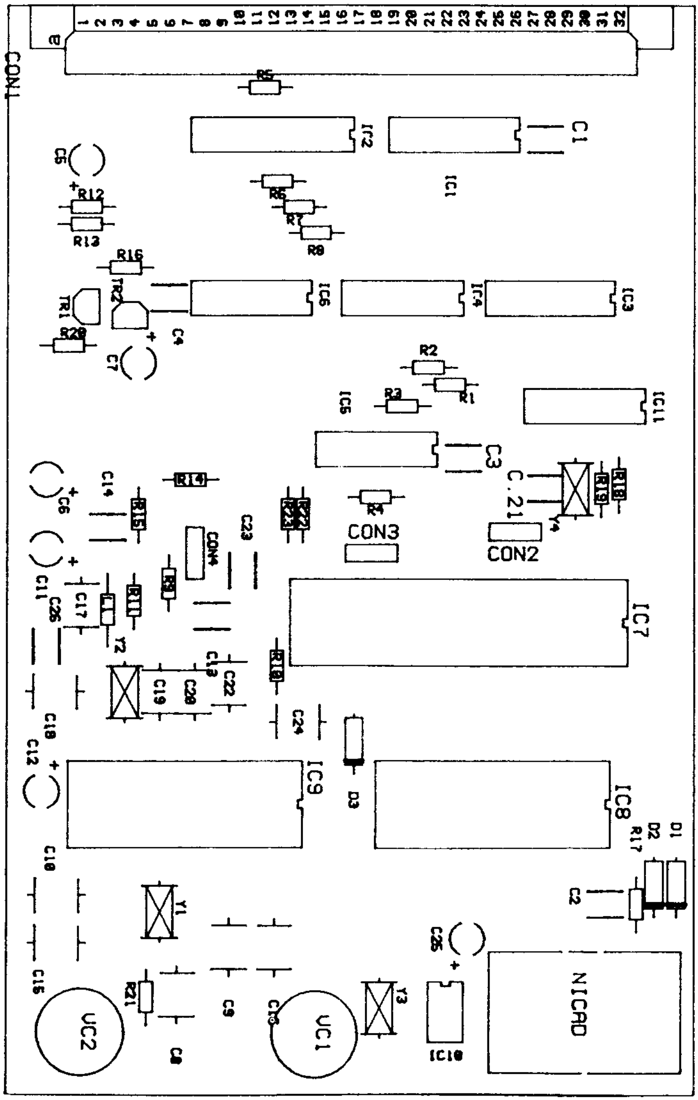


Fig.2 Printed Circuit Board Component Overlay

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Present subscribers will notice the only real change - that the subscription rate has increased to **£12.00**. This reason for this increase is partly due to the U.K. inflation rate and increased postal charges. However, the main reason is in part the reason why UKW Berichte are discontinuing publication - that is one of pure economics. In order to make the magazine a viable concern this level of subscription is a necessity.

I feel sure that you will agree with me that with this level of subscription for the four issues per year that the magazine still represents excellent value for money, especially when compared with the many other commercial magazines available, which contain mostly advertisements and very little actual interesting material.

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UPC1382C	.77
UPC1397C	3.15
14DN156	POA
14DN157	POA
14DN244C	POA

CMOS

4000BE	.08
4001UBP	.08
4002BCN	.09
4011BE	.09
4013BE	.13
4014BE	.23
4015BP	.26
4025BCL	.09
4027BDC	.13
4028BE	.21
4040BC	.22
4041CN	.27
4042BE	.22
4046BCN	.32
4048CN	.19
4049CN	.13
4051BC	.28
4052BP	.26
4053BE	.26
4066BCN	.13
4069CN	.09
4071BE	.09
4075BE	.09
4076BCN	.32
4081BP	.08
4099BE	.32
4502BP	.27
4503BCN	.22
4512BCN	.28
4515BE	.50
4519BCN	.20
4528BP	.28
4538BP	.46
40106BCN	.26
40175BCN	.42

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74HC10	.13
74HC74	.19
74HC175B1	.30
74HC373	.36
74HCT238E	.72

74C CMOS

74C00N	.54
74C150	4.95
74C154	2.48
74C373	1.65
74C912	6.64
75C188	.38

74ALS

74ALS74	.30
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74LS00N	.08
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74LS02N	.08
74LS03PC	.08
74LS05N	.08
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74LS10N	.08
74LS11N	08
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74LS33N	.11
74LS83AP	.32
74LS85N	.20
74LS90	.20
74LS107N	.20
74LS123	.27
74LS125N	.24
74LS145N	.50
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74LS157N	.16
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74LS161AP	.36
74LS245N	.30
74LS352N	.60
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74LS393N	.28
74S174N	.90

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7406N	.07
7409N	.07
7411N	.08
7426N	.08
7442N	.16
7447AN	.18
7483N	.18
7489N	1.40
7490AN	.20
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74123N	.26
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BCX56(S.M.)	.12
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BC119	.35
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BC154	.07
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BC184L	.06
BC213	.06
BC214B	.06
BC214L	.06
BC478	.16
BC549	.06
BC549B	.06
BC557B	.06
BC558	.06
BCY71A	.12
BCY79B	.10
BCY347A	.06
BF137	.25
BF161	.20
BF180	.25
BF184	.15
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2N2926	.08
2N3054	.25
2N3702	.06
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2N4062	.12
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8MHz	1.10
15MHz	1.30
15.625MHz	1.50
15.724MHz	1.65
16MHz	1.30
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BUILDING THE TELETEXT PATTERN GENERATOR

Trevor Brown G8CJS

The new ATV Compendium has a project on page-25 called the 'Teletext Pattern Generator'. This is for a colour pattern generator that uses only five IC's, and can be put together in less than one hour using a PCB available from Members' Services.

The total component count for the project is 5 chips, 7 resistors, 2 capacitors and a 6MHz crystal. The unit delivers RGB video and mixed sync at TTL levels, the mixed sync being of a very high standard, and these signals can be very easily converted into a PAL signal (see later in this article).

CONSTRUCTION & INTERCONNECTION

The PCB from Members' Services is single-sided and requires a few wire links, which should be fitted first. The layout is shown in Fig.1 (Note: a few early boards were issued with an incorrect layout, showing a wire link in the wrong place). Sockets should be fitted for all the IC's, after which the resistors, capacitors and finally the crystal should be installed.

On the underside of the PCB below the Eprom is a link which requires making in one of two ways to suit different Eproms. For 2764 devices bridge the solder break that joins pins-1 and 23 and leave the break that would join pins-23 and 28 open circuit.

Fit all the IC's with the exception of the Eprom, the hex inverter must be a type 74LS04, a 7404 will not do. The SAA5050 and SAA5020 are available from Sendz Components whose address is given at the end of this article.

The RGB and sync outputs can be used to drive an RGB monitor, or TV fitted with a Scart connector, but most of us will require a PAL coded output in order to drive our TV transmitters. I used the Maplin PAL coder which is available as an off-the-shelf kit, complete with a silk-screened PCB and all the necessary components. The kit not only produces PAL video, but has a TV modulator, so that it will drive a standard TV set. This unit can also be assembled in less than one hour and has very few adjustments.

To interconnect the two units, R0 and R1 on pins-3 and 4 of PL2 of the Maplin coder should be connected together and taken to the Red output of our pattern generator. G0 and G1 on pins-5 and 6 of the same socket should be joined together and taken to the Green output and B0 and B1 on pins-7 and 8 to the Blue output. The sync output from the pattern generator should be wired to pin-4 of PL4 on the coder, and pin-3 of PL4 (Blanking) on the coder should be grounded or the unit will not function. The PAL/NTSC connection should be left floating, unless you are planning to take your equipment to the Dayton Hamvention this year!

You will now need to tackle the problem of programming an Eprom to fit into the socket on the pattern generator. There are two choices, you can reach for your cheque book and support GB3ET by ordering a standard colour bar programmed Eprom, or the more expensive customised Eprom complete with your callsign and details (see advertisement elsewhere in this issue.

Alternatively, you may wish to program your own Eprom. This can be achieved by using the simple Eprom programmer

on page-65 of the ATV Compendium. A PCB is available from Members' Services for this project and the unit works in conjunction with a Spectrum computer.

Once the Eprom programmer PCB has been completed and installed on the user socket at the rear of the Spectrum computer a 'clean' 2764 Eprom must be fitted into the socket provided on the PCB.

The programmer is software driven, and to this end requires the custom software available from the GB3ET group (see advertisement elsewhere in this issue). The software comes on cassette and should be loaded into the computer in the normal way. You will then be presented with an on-screen menu:

LOAD A PROM INTO MEMORY 1

BLOW A 2764 PROM 2

BLOW A 27128 PROM 3

LOOK AT MEMORY 4

ENTER BASIC 5

EDIT MEMORY 6

Initially select option-1, when the menu returns to the screen select option-4 to display the contents of the Eprom as loaded into memory. The data should be 'FF' in every location. If this is not the case the Eprom will require erasing (exposure to a UV light source of 2537 Angstroms - see page-67 The ATV Compendium).

Option-6 allows you to edit the memory and thus design your own Eprom, full details of which are again given in The ATV Compendium.

For the more simplistic approach select option-5 on the menu and list the basic. What you see on the screen is not the program but only the Basic header, the last line number being 99. If the program is extended by adding line numbers 100 to 200 as shown in Fig.2, and then RUN 100 entered, this short Basic extension to the program will run through the computer's memory programming colour bars, and will then return to the menu.

Option-4 will now allow you to view the hex data in the computer's memory, and by comparing it to the chart on page-32 of The ATV Compendium you should be able to gain a little insight into how to program your own customised Eprom.

Select option-2, and providing the 21 volt supply is on, the screen will turn red and the contents of the computer memory will be loaded into the Eprom. When all the contents have been transferred and verified you will be returned to the menu screen.

Should a problem arise then the screen will display a failure message, along with the Eprom address at which the error occurred. If all is well and you are returned to the menu screen, remove the Eprom and install it in the pattern generator,

```
100 FOR a=30000 TO 30063
110 READ b: POKE a.b: NEXT a
130 FOR e=0 TO 8156
140 LET x=a-64: POKE a, PEEK x: LET a=a+1
150 NEXT e
160 DATA 23,29,30,0,0,0,19,29,0,0,0,0,22,29,0,0,0,0
175 DATA 18,29,0,0,0,0,21,29,0,0,0,17,29,0,0,0
180 DATA 20,29,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
200 RANDOMISE USR 27014
```

Fig.2 Basic Extension Program

switch on and marvel at your handiwork.

It should be noted at this point that although the menu does not show how to save and load Eprom data to tape or Micro-drive this can easily be achieved from Basic with the commands

SAVE "name" CODE 30000,8192

LOAD "name" CODE

This can be extended to Micro-drive in the normal way:

SAVE * "m";l;"name" CODE 30000,8192

LOAD * "m";l;"name" CODE

The PAL coder needs little or no adjustment. A small trimmer is provided to trim the crystal frequency and this should be set for minimum subcarrier patterning on the screen. No other problems were encountered when putting this versatile little unit together.

Sendz Components, 63 Bishopsteignton, Shoeburyness, Essex, SS3 8AF 0702 332992

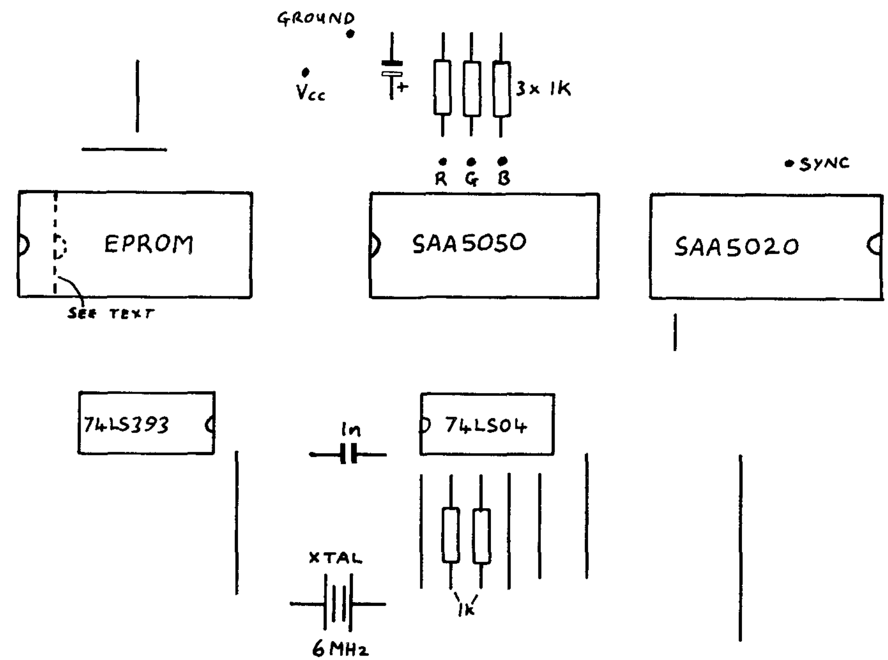


Fig.1 Teletext Pattern Generator PCB Layout

SOFTWARE NOTEBOOK

Kevin Dodman G8HRF

This little program, written in Sinclair Basic, provides a VT clock for adding to the front of those epic video masterpieces! Facilities afforded are: 1) tape serial numbers, 2) tape title, 3) edit crew. At the 5 second count the display goes to black, hit 'S' to start again.

By removing the following lines it is possible to make a simpler version with the clock only: 10, 20, 30, 40, 50, 60, 70, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260 & 270.

As this will not win any prizes for software elegance please feel free to edit, modify, or consign to the bin as you see fit.

```
 10 REM SOFTWARE BY G8HRF
 20 REM V T CLOCK.WHEN CLOCK REACHES 5 SECONDS,SCREEN GOES BLACK
    HIT S TO RETURN
 30 LET A$="TAPE NUMBR"
 40 LET B$="TITLE"
 50 LET C$"EDIT CREW"
 60 GOTO 230
 70 BORDER 0:PAPER 0:INK 7:CLS
 80 LET D=101:LET E=90:LET F=67
 90 CIRCLE D,E,F
100 LET F=65
110 CIRCLE D,E,F
120 LET F=20
130 CIRCLE D,E,F
140  PRINT AT 5,2;"10*": PRINT AT 2,7;"5*": PRINT AT 14,2;"20*":
    PRINT  AT 18,5;"25*" : PRINT AT 20,10;"30*": PRINT AT
    0,12;"0": PRINT AT 1,12;"*"
150 PRINT AT 10,1.2;"*"
160 INK 6: PRINT AT 0,22;A$: PRINT AT 2,22;INK 7 ;I$
170 INK 6: PRINT AT 4,22;B$: PRINT AT 6,22;INK 7 ;J$
180 INK 6: PRINT AT 8,22;C$: PRINT AT 10,22;INK 7 ;K$
190 GOTO 280
200 CLS:BORDER 0: PAPER 0: INK 7: PRINT AT 0,9;"VT CLOCK"
210 PRINT AT 3,1;"1.";A$: DIM I$(10): INPUT I$: PRINT AT 3,16;I$
220 PRINT AT 6,1;"2.";B$: DIM J$(10): INPUT J$: PRINT AT 6,10;J$
230 PRINT AT 9,1;"3.";C$: DIM K$(10): INPUT K$: PRINT AT 9,14;K$
240 PRINT AT 12,1;"IS THIS CORRECT ?"; INK 3;FLASH 1;"Y/N"
250 IF INKEY$="Y" OR INKEY$="y" THEN GOTO 70
260 IF INKEY$="N" OR INKEY$="n" THEN GOTO 200
270 GOTO 250
280 FOR L=0 TO 21:IF L=21 THEN GOTO 350
290 LET M=L/30*PI+500
300 LET P=60*SIN M:LET Q=60*COS M
310 PLOT 100,88:DRAW OVER 1;P,Q
320 PAUSE 42
330 PLOT 100,88:DRAW OVER 1;P,Q
340 NEXT L
350 CLS:IF INKEY$="S" OR INKEY$="s" THEN GOTO 60
360 GOTO 350
```

USING OSCILLOSCOPES

Part–5

Mike Wooding G6IQM

In the first four parts of this series we have discussed the oscilloscope itself. However, when making measurements or whatever with an oscilloscope, what we need is something to connect the circuit/unit under test to the oscilloscope. This can be accomplished with a BNC or whatever lead, a piece of lighting flex, perhaps even a llength of wet string.

Seriously though, any measurements are best made using a probe such as the one shown in Fig.1. By not using a probe, any connection to a circuit could load that circuit causing distortion to the waveform under test. The wire/cable used could act as an aerial picking up stray radiations, causing them to be displayed on the screen along with the test signal.

Thus it can be seen that a probe is by far the best method of inputting signals to our oscilloscope.

Fig.1 Oscilloscope Probe

CIRCUIT LOADING

Using a probe instead of a bare minimises stray signals, but there's still an effect from putting a probe in a circuit called circuit loading. Circuit loading modifies the environment of the signals in the circuit in which the measurement is being made; it changes the signals in the circuit-under-test, either a little or a lot, depending on how great the loading is.

Circuit loading is resistive, capacitive and inductive. For signal frequencies under 5kHz the most important component of loading is resistance. To avoid significant circuit loading here all that is required is a probe with a resistance at least two orders of magnitude greater than the circuit impedance (100M probes for 1M sources, 1M probes for 10k sources and so on).

When making measurements on a circuit that contains high frequency signals inductive and capacitive loading become important. Capacitive loading cannot be avoided when making connections, but more than necessary capacitance can be avoided.

One way to accomplish this is to use an attenuator probe; its design greatly reduces loading. Instead of loading the circuit with capacitance from the probe tip plus the cable plus the oscilloscope's input, the 10x attenuator probe introduces about ten times less capacitance, as little as 10–14pF. The penalty is the reduction in signal amplitude from the 10:1 attenuation.

These probes are adjustable to compensate for variations in oscilloscope input capacitance and the oscilloscope has a reference signal available at the CAL output. Making this adjustment is called probe compensation and is carried out as follows:

Connect the probe lead to one channel of the oscilloscope and hook the probe on to the CAL output from the oscilloscope. Adjust the timebase and amplitude controls for a satisfactory picture on the oscilloscope, which should be showing a squarewave signal. Using a small screwdriver or trimming tool, adjust the compensation control on the probe until the best squarewave is displayed on the oscilloscope, with minimum overshoot and the top and botton of the squarewave as flat as possible.

It must be remembered that when making high frequency measurements that the probe's impedance (resistance and reactance) changes with frequency. The probe's specification sheet or manual will contain a chart such as shown in Fig.2, which indicates the impedance change versus frequency.

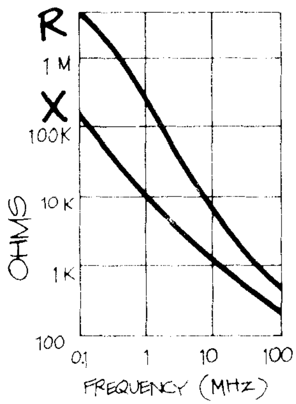


Fig. 2 Probe Impedance Chart.

Another point to remember when making high frequency measurements is to be sure to ground the probe with as short a ground clip as possible. As a matter of fact, in some high frequency applications a special socket is provided in the circuit and the probe is plugged into that.

MEASUREMENT SYSTEM BANDWIDTH

There is yet one more probe characteristic to be considered and that is bandwidth. Like oscilloscopes, probes have bandwidth limitations, each has a specified range within which it does not attenuate the signal's amplitude by more than 3dB (0.707 of the original p-p value). However, it cannot be assumed that a 60MHz probe and a 60MHz oscilloscope will give a 60MHz measurement capability. The bandwidth of the combination will approximately equal the square root of the sum of the squares of the rise times of the oscilloscope and the probe.

To get the full bandwidth from the oscilloscope, a probe with a higher bandwidth must be used, or the specific probe for the oscilloscope must be used. This combination will then give the full bandwidth.

For example: in the case of the 2200 series of Tektronix oscilloscopes and the P6120 10x passive probe, the probe and the oscilloscope have been designed to function together and give the full 60MHz bandwidth at the probe tip.

PROBE TYPES

Generally probes can be divided into voltage sensing and current sensing types. Then, voltage sensing types can be further subdivided into passive and active types. One of these should meet most measurement requirements.

A table overleaf lists the most common types and gives their basic characteristics.

PROBE TYPE	CHARACTERISTICS
1x passive voltage'sensing	No signal reduction, which allows the maximum sensitivity at the probe tip; limited bandwidths: 4-34MHz; high capacitance 32-112pF; signal handling to 500V.
10x/100x/1000x passive voltage-sensing attenuator	Attenuates signals; bandwidths to 300MHz; adjustable capacitance; signal handling to 500V (10x), 1.5kV (100x) or 20kV (1000x)
active voltage-sensing FET	Switchable attenuation; capacitance as low as 1.5pF; expensive, less rugged than other types; limited dynamic range; but bandwidths to 900MHz; minimum circuit loading
current-sensing	Measure currents from 1mA to 1000A; DC to 50MHz; very low loading
high voltage	Signal handling to 40kV

Table 1 Probe Types and their characteristics

CHOOSING THE CORRECT PROBE

For most applications the probes supplied with an oscilloscope are the ones that should be used. These will usually be attenuator probes. Then, to ensure that the probe can faithfully reproduce the signal for the oscilloscope the compensation should be adjusted as described above. If probes other than those supplied with the instrument are to be used, pick the probe based on the voltage that it is intended to measure.

For example: if a signal of 50V in amplitude is to be examined and the largest vertical sensitivity available on the oscilloscope is 5V/DIV, then that signal will take up ten major divisions of the screen. This is a situation where a 10x attenuator probe should be used, thus reducing the amoplitude of the signal to reasonable proportions.

Correctly termination is important to avoid unwanted reflections of the signal being measured within the probe cable. Probe/ cable combinations designed to drive 1M inputs are engineered to suppress these reflections. But, for 50-ohm oscilloscopes, 50-ohm probes should be used. The correct termination is also necessary when using coaxial cables instead of a probe. If a 50_ohm cable is used with a 1M oscilloscope input be sure to terminate the cable with a 50-ohms at the oscilloscope input socket.

The probe's ruggedness, its flexibility, and the length of the cable can also be important (but remember, the more cable length, the more capacitance at the probe tip). And check the specifications to see if the bandwidth of the probe is sufficient, and ensure that all the adaptors and tips

required are available. Most modern probes feature interchangeable tips and adaptors for many applications. Rectractable hook tips allow the probe to be attached to most circuit comp[onents.

Other adaptors connect probe leads to coaxial connectors, or slip over square pins. Alligator clips for contacting large diameter test points are another possibility.

For the reasons already mentioned (probe bandwidth, loading and termination) the best way to ensure that the oscilloscope and p[robe measurement system has the least effect on the measurements is to use the probe recommended for the oscilloscope in use. And always make sure that the probe has been compensated.

However, for all the points mentioned - probe bandwidth, loading, termination - the best way to ensure that the probe and oscilloscope measurement system has the least effect on the circuit-under-test is to use the probe recommended for the oscilloscope in use. *And always ensure that the probe compensation has been carried out first.*

In part-6I shall begin discussing measurement techniques, with a brief examination and description of waveform shapes and characteristics.

I wish to thank Tektronix U.K. Ltd. for their help, advice and permission for the use of certain material in this series.

IN RETROSPECT

GUNN MODULATOR CQ-TV 141 & THE ATV COMPENDIUM

Bob 'Gunn Diode' Platts writes to tell us that several queries and a couple of problems have been received relating to this PCB:

1) The output voltage will not go above about 7.5V. This is due to the emitter/base voltage drop of TR2/TR5 and the output circuitry within IC1. Solution: Cut the track to pin-7 of IC1. Connect pin-7 to the positive end of C8 (supply input). This will allow the output to be varied over the required range of about 5.5 to 9 volts.

2) Tuning control VR3 is only effective for a portion of its travel. VR2 (Vref) should be set at 4.3 to 4.5 volts. If full rotational control is still not achieved adjust the value of R21.

3) What is R23 ? This was not fitted on the original design, the value is not critical, any value from 0 to 47-ohms may be used.

4) A heatsink must be fitted to TR2.

5) The TX/RX line is to attenuate the video to give plain carrier. In most applications it would be unused.

6) Vision interference can be caused by stray pickup on the AFC line. If so, decouple to ground with about 10uF.

If the 10V regulated supply (TR1 etc.) is not to be used to power other circuitry, i.e: subcarrier oscillator, PLL Demodulator, etc., then TR1 may be omitted and a wire link fitted from the base to emitter pads.

If surplus Gunn Diodes are to be used it could be worthwhile trying several, as their tuning and modulation characteristics can vary considerably.

MODIFYING A 'SKYSCAN' LNB FOR 24CM

Bob PLatts G8OZP

Some types of KU band LNB's can with care be converted for use in a 3CMs ATV RX. Some of those suitable are: the SAT-TEL FB3 (see the ATV Compendium), and the ECHOSPHERE LNB1095 and SKYSCAN L1, (covered in this article). Other types ie: the Amstrad (Marconi) BSB etc LNB's are not suitable for conversion.

The Echosphere / Skyscan device has a four stage GaAsFET RF amp with a noise figure of 2-2.5db, a mixer fed from a dielectric resonator local oscillator at 10GHz and an IF amp. The overall gain is around 50db.

The modification has three stages:

1) Modifying the DRO. local oscillator to operate at 9.1GHz.

2) Construction of an adaptor to match the LNB's WG17 flange to WG16, as generally used on 3CMs.

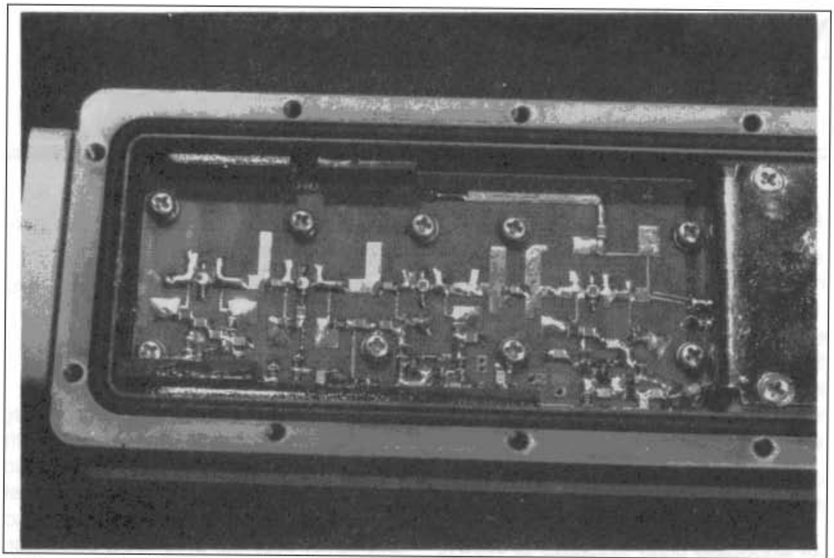
3) Retuning the LNB. front end to 10.250GHz.

PROCEDURE

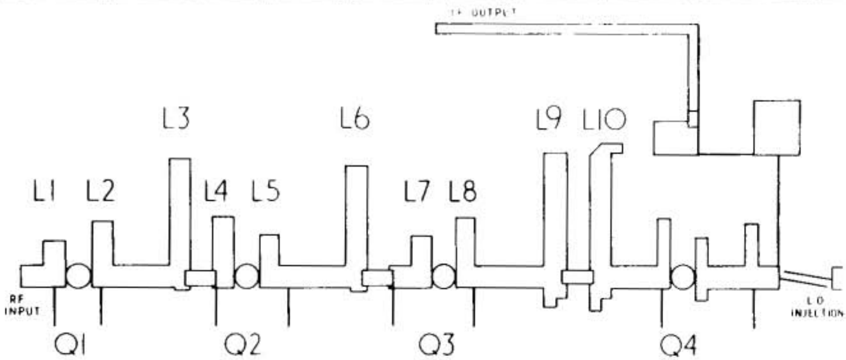
1) Look at the aerial inside the waveguide to establish on which side of the unit the RF board lives. Remove the 10 cover screws to gain access. After marvelling at the gubbins remove the four cross head screws and cover over the DRO local oscillator.

NOTE: To prevent the possibility of any static damage, before touching any of the components connect yourself to the LNB case. A couple of feet of solder, one end twisted around a wrist and the other around the connector will do the trick.

The DRO puck is located underneath the



An Unmodified 'Skyscan' LNB

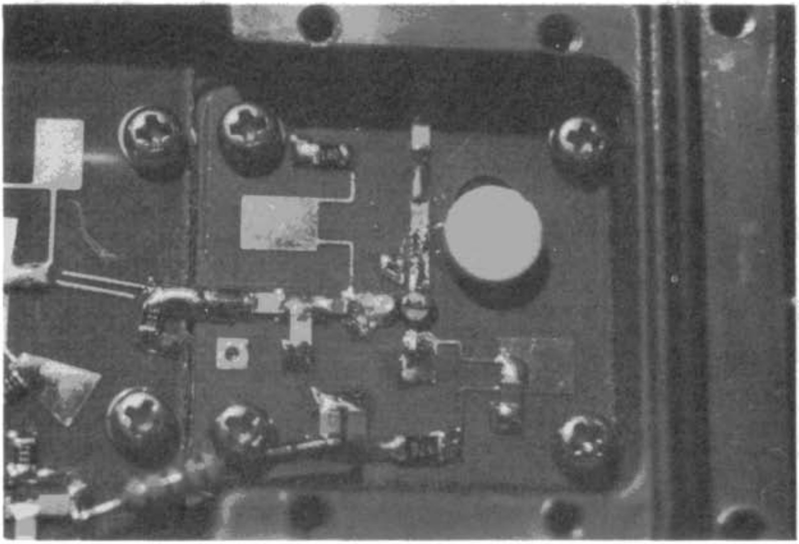


Inductor layout of the 'Skyscan' LNB

local oscillator tuning screw, alongside the microstrip line. The 10GHz puck is fixed in by a brittle adhesive. Prising at it's base with a small screwdriver will remove it.

A 9.1GHz device (Siemens 38DR09.10) should be glued in the same location with a small spot of clear nail varnish applied to the corners. Replace the cover when the varnish has dried.

With a suitable receiver connected a picture from a 10.250GHz source should be found by tuning around an IF of 1.05-1.2GHz. Screwing out the DRO tuning screw decreases the LO frequency, hence raising the IF. With the screw all most out an IF in the 24CM band can be obtained.



The Local Oscillator of a 'Skyscac' LNB with a 9.1GHz Puck fitted

2) The method of construction for an adaptor from the WG17 of the LNB to WG16 will depend on the facilities available. All that is required is a section of waveguide tapering from one internal dimension to the other, over a distance of at least two wavelengths. The taper need not be symmetrical, but should be even. Any solder accidentally getting on the inside walls should be removed as it is very lossy at 3CMs.

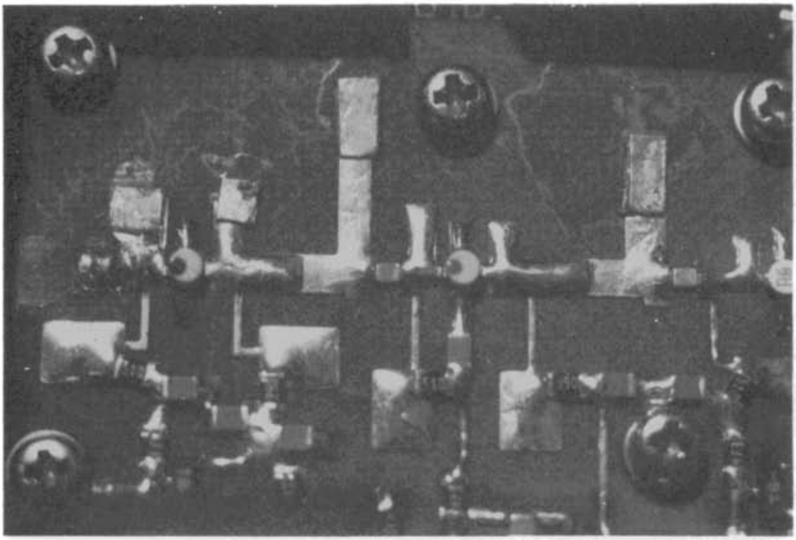
Several forms of construction are possible. Filing the sidewalls from a length of WG16 to the required taper, then fitting new ones made from copper, brass or PCB is one way.

Alternatively, a tapered length of guide can be made by tightly wrapping copper or brass foil around a hardwood former cut to the required size, then fitting to homebrew flanges. This technique can also be used with aluminium foil and epoxy resin. Electrical continuity along a guide is not important, but an even tranisition is.

3) The RF front end now requires tuning down to 10.250GHz by the addition of small foils to some of the microstrip lines. These should be cut from copper foil. The exact size of the foils is not critical, but should be as close as possible to those shown in the photograph. A test rig comprising a low power source, together with attenuators is required for tuning up the unit. If commercial attenuators are not available, then hardwood or antistatic foam within the waveguide may be used.

L6 should be fitted and adjusted first. Place the foil in the approximate position, then carefully move up or down the line to find the optimum point. A tiny spot of clear nail varnish applied to one side with a pin or simular device will will hold the foil in place. When the varnish has dried fit and adjust the next in the sequence L3, L2, L1.

A shaved down matchstick or small Nylon trimming tool is ideal for making the adjustments. If the tool alters the tuning as it is moved near a line then a different material should be used. As the adjustments are made reduce the signal



A modified 'Skyscan' LNB showing inductors L1, L2, L3 and L6

strength to maintain a noisy picture to tune against. Take care not to short any lines to earth. On both units so far converted by the author no real improvement was obtained by adjusting the other lines, however on some units an improvement may be found.

The DC fed to the LNB via the co-ax should normally be 18v. The unit will however function on supplies down to 11v without damage.

The Siemens 38DRO9.10 9.1GHz puck is available from: Oakbury Components, Oakbury House, 12 Oxford Road, Newbury, Berkshire, RG13 1PA. Tel: 0635 521077.

10GHZ ATV THE EASY WAY !

Jim Toon G0FNH

At this year's BATC convention, along with Dave G8NND, Steve G8JMJ and Bob G8OZP, I put on a display of my simple 10GHz ATV station. A great many people showed a lot of interest in the 10GHz set up because of the quality of the pictures and the simplicity of construction. Editor Mike also had a good look at the gear and convinced me that I ought to let him have the details for an article in CQ-TV - so here it is.

Basically, all that I have done is to put together a lot of ideas from various publications, including the RSGB VHF/UHF Manual 4th Edition, The Microwave Newsletter and CQ-TV. My thanks to all.

I use a separate transmitter and receiver utilising Solfan heads without the in-line mixer diodes for both. It is quite permissible to use Solfan heads with in-line mixers, but the results obtained are not as good.

THE TRANSMITTER

The circuit diagram of the transmit modulator and Gunn diode power supply is shown in Fig.1, the PCB layout in Fig.2 and component overlay in Fig.3. Once the board has been assembled and checked for short circuits and mis-placed components, **WITHOUT** the Gunn diode connected, apply the 12V supply. Confirm that by adjusting the 10-turn preset potentiometer that the output voltage to the Gunn diode can be varied between 6 and 10 volts. Re-set the Gunn supply to 7 volts. Turn off the supply and connect the head unit, not forgetting to fit the 470-ohm resistor and the 0.01uF capacitor across the Gunn diode (see Fig.11).

WARNING: Gunn diodes are negative resistance devices, the lower the bias voltage, the lower the resistance and hence the higher the current. If bias below +5.5 volts is applied to the Gunn diode it may be damaged. Also, **NEVER** look into a head unit with the power switched on. Similarly, it is inadvisable to look into, or stand in front of, an illuminated dish or launching unit. **MICROWAVE RADIATION CAN BE DANGEROUS.**

N.B: At this point Jim referred us to an article in CQ-TV 136 for setting up the transmit frequency of a Solfan head, but for completeness I have included here the instructions from the project in the ATV Compendium ... Ed.

The transmit frequency should be set to 10.250GHz, and if an SHF frequency counter is not available this alternative method can be used: Remove any components at the Gunn diode. (Whilst microwave devices of this type are not particularly sensitive to handling, it is advisable to keep any contact with unconnected Gunn diodes to a minimum. Also, the use of isolated soldering equipment is recommended).

If a Solfan head is being used then it is likely that the oscillator will be set to around 11Ghz. Initially undo the brass locknut and screw in the brass screw by 1-turn. DO NOT move the steel screws yet. Fix the head unit firmly to a flat surface and apply about +7.5 volts to the Gunn diode. Connect a multimeter between the mixer diode and ground with the Gunn supply on a current of between 1 and 3mA should be shown on the meter. Take a flat piece of metal and, keeping it parallel to the mouth of the horn, move it slowly away and watch for a minimum reading on the meter. When this condition occurs mark the position of the plate. Continue moving the plate outwards until another position of minimum

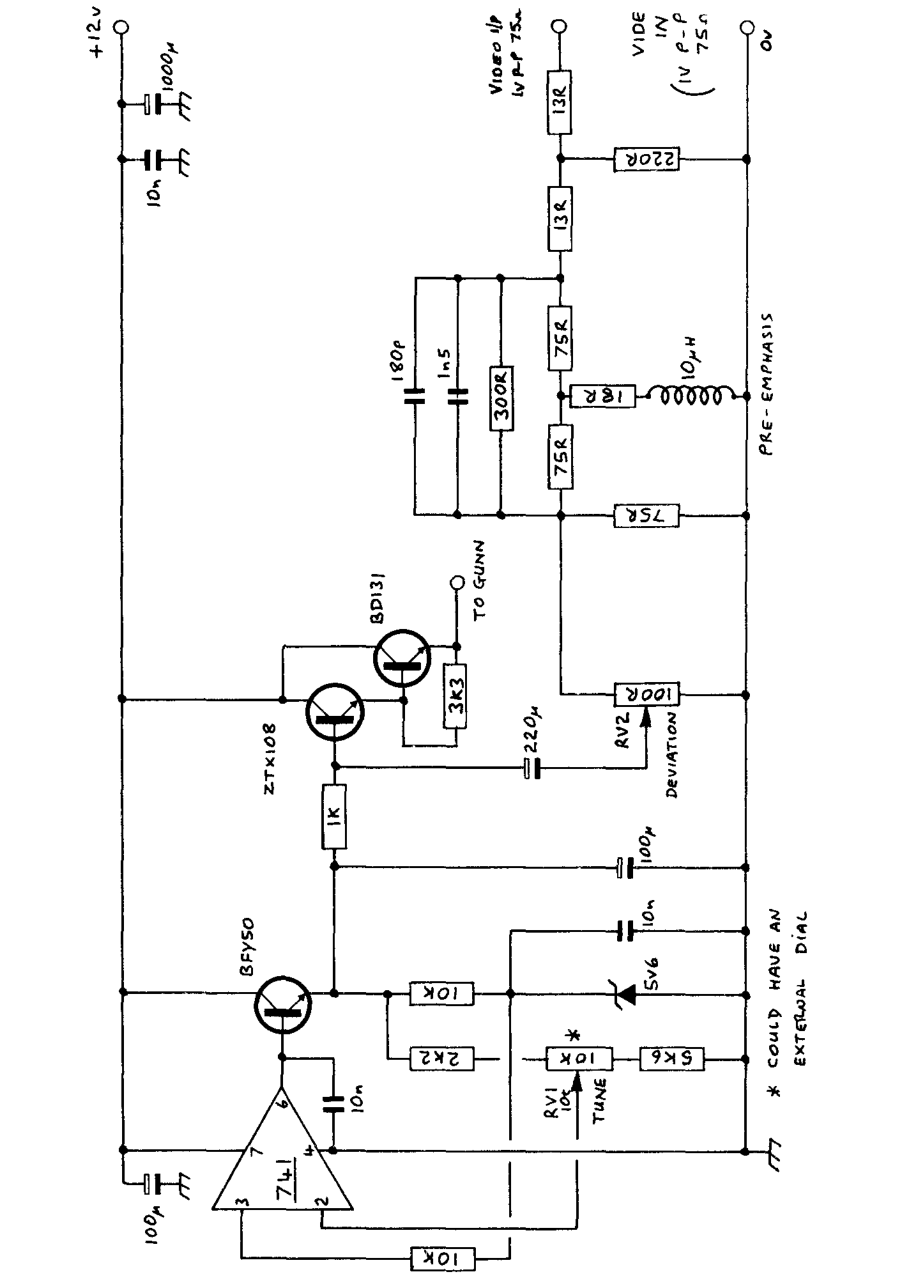


Fig.1 Transmitter Modulator and Gunn Diode supply.

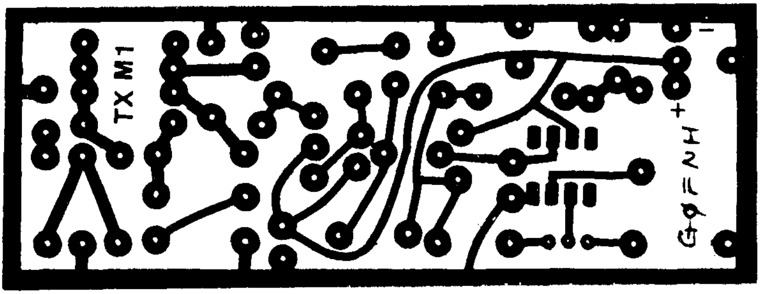


Fig.2 Transmitter Modulator and Gunn Diode supply PCB layout.

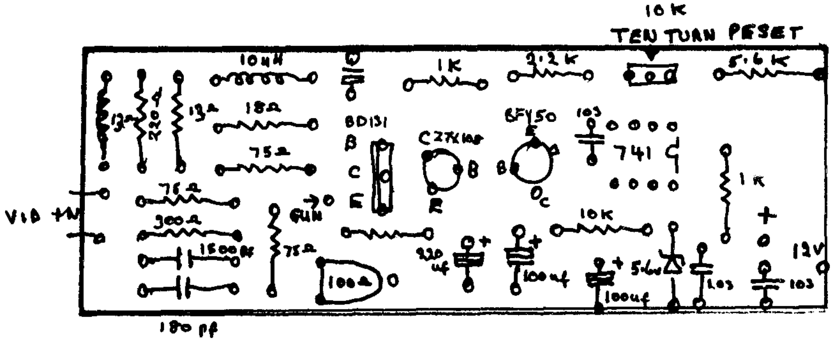


Fig.3 Transmitter Modulator and Gunn Diode supply PCB component overlay

current is found and again mark the position of the plate. The distance between the two marks is half the wavelength of the oscillator and from this can be determined the frequency.

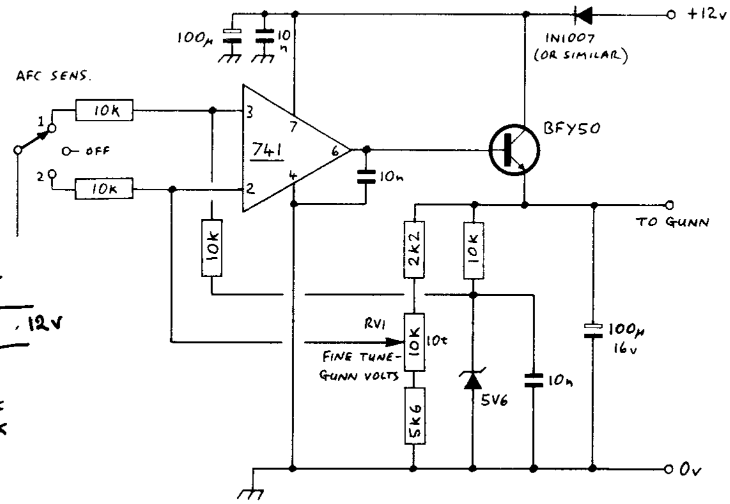
The accuracy of this method can be improved by finding several minimum positions and averaging the result. If the frequency is not correct make small adjustments to the **BRASS** screw until the correct frequency is obtained, turning the screw in reduces the frequency and screwing it out raises it. The following equation is used to determine the actual frequency from the wavelength measurements:

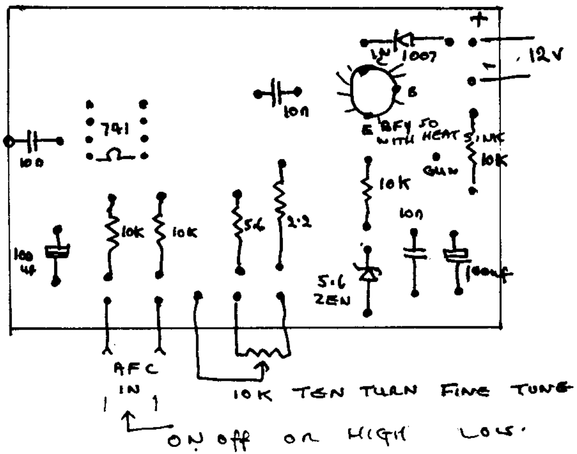
Frequency = 150 / distance in millimetres

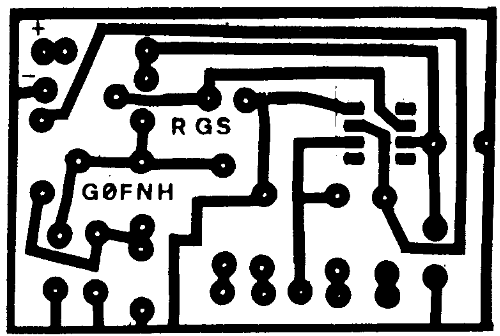
If a transmit head unit other than the Solfan type is used, the same method as above can be employed to calculate and thus set the oscillator frequency, but some experimentation with the tuning screws will be required to ascertain the correct procedure.

Finally, fine-tuning of the transmit frequency is obtained by adjusting the 10-turn preset on the modulator PCB.

Apply a 1 volt peak-to-peak video signal to the input and, with the aid of an oscilloscope, confirm that approximately 50mV of video is superimposed onto the Gunn diode supply voltage whilst varying the deviation potentiometer. If an oscilloscope is not available, set the potentiometer towards its low end and then adjust as necessary for best pictures on a







Fig's.4, 5 & 6 Receiver Gunn Diode supply, PCB layout and overlay.

receive system.

If required an external tuning potentiometer can be used so as to vary the transmit frequency whilst in use. However, I have found, as have most other operators, that it is better to have the transmit frequency fixed and to tune the receiver, as is done on the other bands.

The modulator PCB should be fitted into a small die-cast box, with the Solfan head mounted onto it and a small dish or horn aerial mounted onto the head. Sockets for the video input and DC power supply can then be fitted to the box as required.

THE RECEIVER

The circuit diagram of the receiver is shown in Fig.4, with the PCB layout in Fig.5 and the component overlay in Fig.6. Once the PCB has been loaded, checked for short circuits and mis-placed components, the Gunn diode bias supply is checked as explained earlier for the transmit modulator PCB. After confirming that the voltage swing available is correct reset the 10-turn potentiometer to give a bias of approximately 7 volts. The Solfan head should be course adjusted to 10.250GHz as explained earlier for the transmit head unit.

The PCB should again be mounted inside a small die-cast box mounted directly onto the Gunn diode head

As stated earlier I prefer to use a head unit without an in-line mixer diode. The Gunn diode head (the local oscillator) is mounted onto one port of a cross-coupler, with the opposite port terminated with a small waveguide load. The dish or horn aerial is fitted to one of the ports of the cross-coupled arm and a diode detector fitted to the opposite port.

Cross-couplers are not difficult to manufacture and several designs are featured in the RSGB VHF/UHF Manual 4th edition. Alternatively they can often be obtained at rallies for around £2 to £4 each. Similarly, diode-detectors are easily obtained at rallies. Once again do not forget to add the 470-ohm resistor and the 0.01uF capacitor across the Gunn diode, and on the diode-detector add a 10K resistor across the diode (see Fig.11).

IF PRE-AMPLIFIER

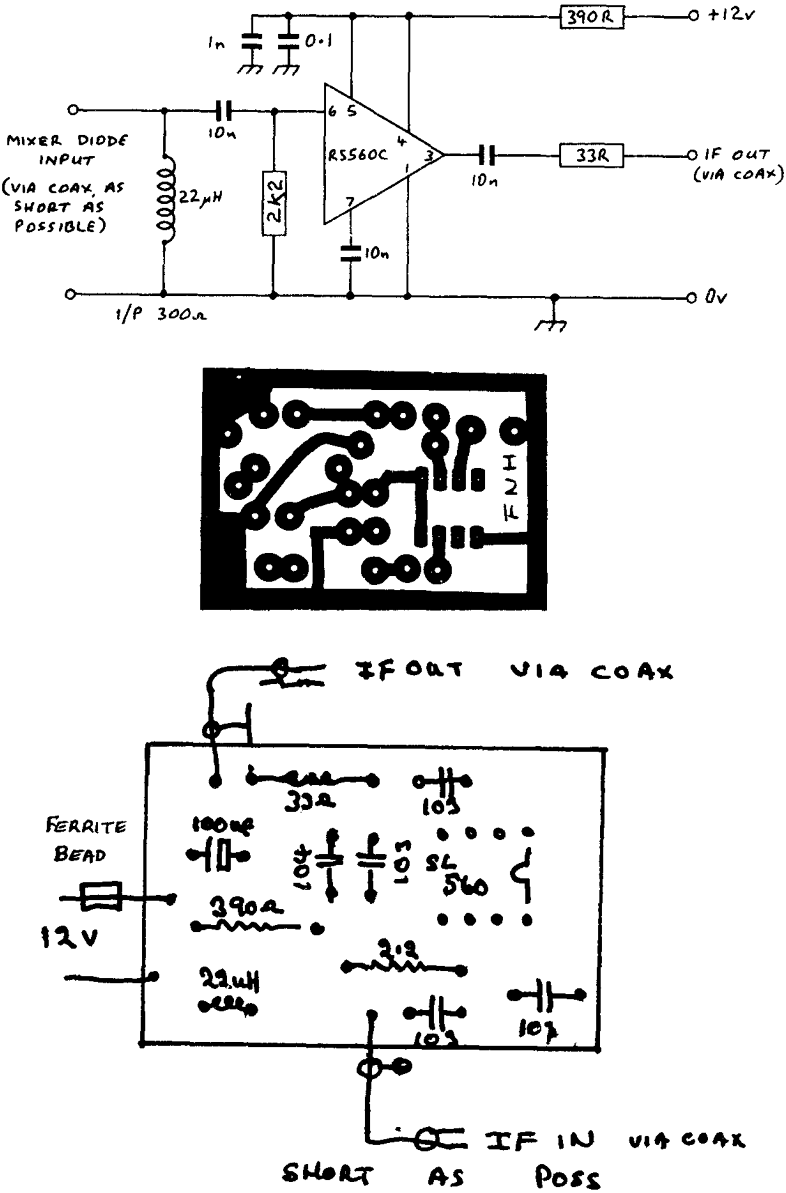
Now we come to the pre-amplifier, the circuit of which is shown in Fig.7, the PCB layout in Fig.8 and the component overlay in Fig.9. This unit must be constructed using double-sided PCB material and fitted inside a small die-cast box. The unit should then be mounted as close as possible to the mixer diode in the diode-detector. The IF output from the pre-amp is taken via a coaxial lead to the BATC FM ATV demodulator PCB. The demodulator PCB is built according to the instructions supplied with if from BATC Member's Services, and then modified as shown in Fig.10.

Setting up the receiver is accomplished as follows: after ensuring that the local oscillator head is running at around 10.250GHz switch off the AFC and tune in the best possible picture from the transmitter by adjusting the brass tuning screw on top of the Solfan head.

NOTE: Ensure that the transmitter is some distance away from the receiver otherwise the receiver will be swamped and incorrect tuning may occur. Also, it may be necessary to readjust the video deviation on the transmitter to achieve good results.

Once the best possible picture has been tuned in using the brass tuning screws fine tuning is achieved by adjusting the 10-turn potentiometer on the receiver Gunn diode bias supply. Now switch the AFC on and select High or Low as appropriate and that's it! With a little practice you soon get the hang of tuning signals in.

Audio can be added to the system, but this has been covered many times in other 3CM projects, and there are many ideas around showing how this can be accomplished



Fig's.7, 8 & 9 Receiver IF pre-amplifier, PCB layout and component overlay.

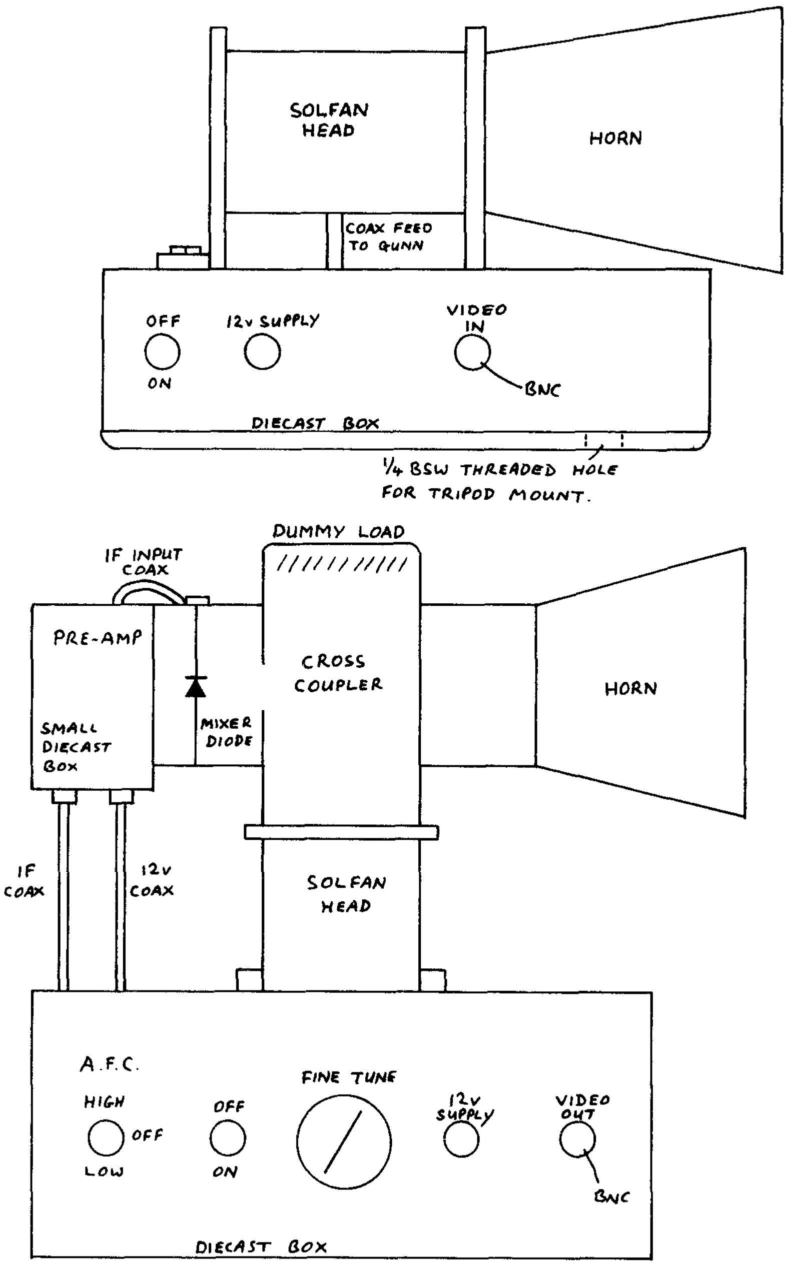


Fig.12 Mounting methods for the various assemblies.

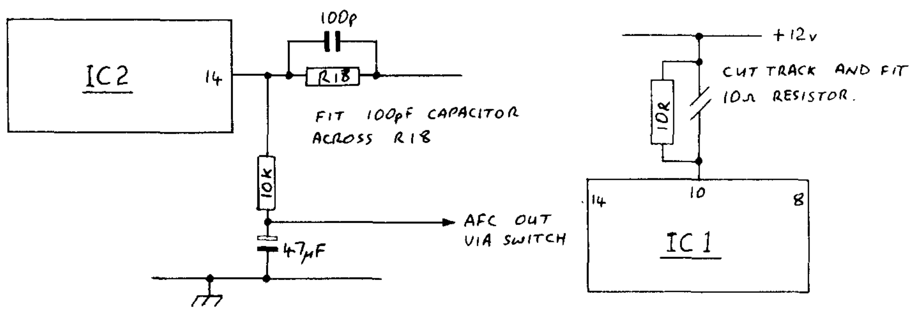


Fig. 10 Modifications to the BATC FM Demodulator.

(see CQ-TV 136/137/141 or the ATV Compendium for further information).]

Fig.12 shows how I mounted the transmit and receive units into their respective die-cast boxes.

That completes this simple, but effective, 10GHz ATV station. Very soon Solfan Heads, cross-couplers, waveguide, plumbing etc will probably be old hat - but I enjoy it!

See you on the band.

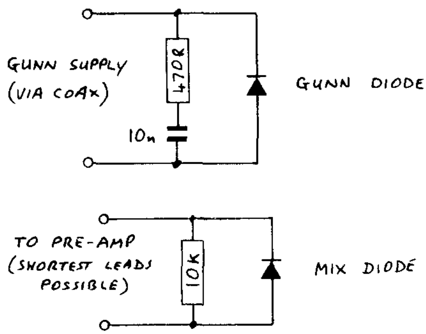


Fig. 11 Connections to Gunn Diodes

BROADCAST BAND DX-TV RECEPTION

Gary Smith & Keith Hamer

No shortage of reception reports this time round. It's been a good season if you've been in the right place at the right time, and have carefully scrutinised and co-channel signals. On the other hand, many enthusiasts have complained that it's been a rotten season compared with past ones.

The more elusive DX has been coming in at times and Simon Hamer has excelled himself once again with more Band III Sporadic-E reception -this time Algeria on channel-E7 (June 3rd) during an opening to Spain and Morocco. Shortly after, a 525-line picture appeared on A2! Other signals of great importance include USSR on channel R5 (with unidentified co-channel signals on various dates), TVE-1 E7 and short-skip Sporadic-E signals from Eire, Netherlands and Belgium. In general reception from Jordan, Albania and Iceland has been plentiful this season.

An Italian private station is radiating colour bars with a white band across the centre on channel-IA. We've failed to identify it so far, but suspect it could be 'Tele Uno' using a new test pattern.

The logs below are edited extracts from the logs featured in TeleRadio News Issue-48. Times shown are in UTC.

JUNE LOG

03/06/90: An intense early evening Sporadic-E opening produced the following exceptional signals:

	E4 RTM (Morocco) with Koran	(SH)
	E7 RTA (Algeria) via Band III SpE!!!	(SH)
	A2 Unid 525-line signal from west	(SH)

08/06/90: A hectic all day Sporadic-E opening with the following noted:

0730	R1 TSS (USSR)	(SM)
0815	R1 MTV-1 (Hungary) with 'Szunet' (Interlude) caption	(SM)
0830	E2 and E3 TVE-1 (Spain) progs	(SM)
	E3 and E4 TVZ (Yugoslavia) FuBK and opening sequence (E4)	(SM)
0858	E2 Unid FuBK followed by clock and YL announcer	(SM)
0905	E3 JTV (Jordan) PM5544 with tone floating with JRT	(CH)(GS)
	R1 TSS 'UEIT' test pattern	(SM)
0915	R3 TVP (Poland) prog	(SM)
0930	E3 TVL (Yugoslavia) with 'JRT' 'RTV LJNA' PM5544	(SM)
1000	R1 TVP film	(BB)

08/06/90:	1030	E2 SRG-1 (Switzerland) with '+PTT SRG1' FuBK	(CH)
		E4 TVZ-1 FuBK with 'JRT ZGRB1' ident	(CH)(SM)
		IA and IB RAI UNO (Italy) progs	(CH)(SM)
	1100	R2 and R£ TVP progs	(SM)
	1135	R1 TVP PM5544	(SM)
	1250	R2 TVP (2 transmitters)	(SM)
	1310	R1 and R2 MTV-1 with multiburst test pattern	(SM)
	1330	R2 TSS UEIT test card (2nd net. Ukraine??)	(SM)
	1750	E3 and E4 RUV (Iceland) with World Cup	(BB)(BBo)
	1802	R1 TSS news and sport	(BBo)(IM)(SH)(SM)
		R2 and R3 TSS news and sport	(IM)(SH)
		R4 and R5 TSS (SH)	
		R5 Unid prog, in Cyrillic co-channel to TSS - Bulgaria??	(SH)
		E2, E3 and E4 NRK (Norway) and SVT-1 (Sweden)	(SH)(SM)
		E4 RUV and YLE (Finland)	(SH)
	2300	L2 TDF Canal Plus (France) progs.	(CH)

12/06/90: A major aurora was noted at 2200 in Aberdeen by Iain Menzies. Earlier in the day a tropospheric lift produced signals from various countries, including Denmark E5, 7, 8 & 10; TV2 Denmark E26, 30 and 35; Norway E5 and 11; Sweden (SVT-1) E8 and 9; Sweden (SVT-2) E30, 23 and 33. (CH)

15/06/90: High m.u.f.s. encountered with Czechoslovakia and USSR stations noted as high as 82.25Mhz. Highlights included:

1450	E4 TVZ (Yugoslavia) progs	(SM)
	Unid Italian private station just below E2	(SH)
	IC Unid Italian TX	(SH)
	E3 Unid coloured newsreader - Nigeria?	(SH)
	E3 RTP (Portugal)	(SH)
	E3 EPT-1 (Greece)	(SH)
	E3 and E4 RUV (Iceland)	(SH)

16/06/90: early morning signals from Spain and Italy. High m.u.f. encountered during early evening with Poland up to channel-R3, Czechoslovakia R4 and USSR up to R5. Also on R5, a transmission thought to have originated in Bulgaria.

Tropospheric reception included Eire, Benelux, France, Denmark, Sweden, Norway, West Germany and East Germany. Highlights were: (SH)

E48 SSVC (British Forces - West Germany)	(SH)
E49 and E52 SAT-1 (West Germany - local satellite relays)	(SH)
A80 AFN-TV Soesterberg (Netherlands)	(SH)

17/06/90: An all day Sporadic-E opening from central and southern Europe. At 1250 Chris Howles resolved a caption on IB which is thought to have originated from a new Italian private station. It read 'La Italia Canale Otto Video'.

Tropospheric reception included Switzerland in Band III and at UHF (SH)

18/06/90: An all day Sporadic-E opening with Spain, Italy, Yugoslavia and central European countries present. Short skip Sporadic-E reception also noted followed by small transatlantic opening!

0655	E3 JTV (Jordan) with 'JTV' ILEH' PM5534	(CH)
1800	R1 and R2 TSS with World Cup	(BBo)
	IB RTE-1 (Eire) - short skip and very strong	(SH)
	E3 RTBF-1 (Belgium) - short skip very strong	(SH)
	E4 NED-1 (Netherlands) - short skip SpE	(SH)
	E3 DR (Denmark) progs via normal SpE	(SH)
1845	E2, E3 and E4 NRK with fish recipes	(SH)
	E2, E3 and E4 SVT-1 on 'Matador' (Danish serial)	(SH)
	E2, E3 and E4 ARD-1 progs	(SH)
1930	A2 Unid 525-line signal	(SH)
	E3 and E4 RUV (Iceland)	(SH)

19/06/90: All day Sporadic-E opening with signals from Russia, Poland, Iceland, West Germany, Spain, Czechoslovakia, Switzerland and Italy.

22/06/90: All day Sporadic-E opening from mainly Spain, Italy, Norway, finland and Sweden. Short openings to Iceland and Denmark. Also, an unidentified programme from the south at 1840, which is thought to have originated in Nigeria.

27/06/90: Late morning Sporadic-E opening with Italy, Jordan, Czechoslovakia, USSR, Poland, Hungary and later Spain, France and Switzerland.

30/06/90: Interesting Sporadic-E reception occurred around noon:

1127	IA RAI UNO caption and clock	(BB)
1130	IA Unid colour bars with white band	(CH)(GS)
	E4 Unid PM5544 floating with JRT - Syria???	(CH)
	E2 Unid Italian private TX with 'SCREEN SPORT' logo	(CH)(GS)
	E3 JTV with 'JTV' 'SUWEILEH' PM5534 and text pages	(CH)(GS)
1438	R2 TSS UEIT test card!!!	(GS)
	USSR, Spain and Italy present until 2200	

JULY LOG

02/07/90: An all day opening from 0500 until 2200 including many Norwegian test patterns showing transmitter identification, e.g. Hemnes, Gulen, Steigen, Bremanger, Gamlen and Melhus. Other signals included Finland, West Germany, Iceland, USSR (up to 93.25MHz) Hungary and Czechoslovakia.

05/07/90: Early evening Sporadic-E opening from the south including Morocco.

08/07/90: Unidentified colour bars with white band noted on channel-IA at 1219. Also seen was the old USSR '0249' monoscopic test card. (GS)

12/07/90: High m.u.f. noted with USSR on channels-R1, R2, R3, R4 and R5 (SH)

13/07/90: Good early morning tropospheric lift. Best DX stations noted:

E50 Canal Plus Belgique progs - new Wavre TX via trops (CH)

E33 Unid AFN-TV 525-line TX P5 quality!!! (CH)

E12 Unid W.Ger. news prog PAL colour (not Swiss or DFF) (CH)

E48 Ned-1 (Netherlands) low-power relay (CH)

E45 TELE 21 (Belgium) 500W relay (CH)

E12 SRG1 (Switzerland) E12 DFF-1 (East Germany) (CH)

A80 AFN-TV (Soesterberg) 525-line TX (CH)

14/07/90: All day opening with Norway, Sweden, Spain, Albania (1700 UTC) and USSR up to channel-R5 (93.25MHz).

15/07/90: The RAI UNO 40W channel-E2 relay noted (Campione d'Italia). Good early morning tropospheric lift with Switzerland, Denmark, Norway, Netherlands and West Germany.

21/07/90: Tropospheric lift including signals from East Germany and an unidentified PAL transmitter on E12 with weather map of West Germany. (CH)

26/07/90: Tropospheric reception of Spain on E7 (mobile DX-ing) (SH)

AUGUST LOG

01/08/90: An intense Sporadic-E opening from all directions. Countries included Italy (up to channel IC), Yugoslavia, Finland, Norway, Sweden, West Germany, Austria, Spain, Portugal, France, Czechoslovakia (up to channel-R4), USSR (up to channel-R5), Rumania, Greece, Jordan, Morocco and short skip SpE from Eire.

02/08/90: Another excellent Sporadic-E opening featuring Denmark, Yugoslavia, Italy, Austria, Switzerland, Rumania, Albania and Iceland, plus a co-channel transatlantic 525-line signal on channel-A2/E3 at 2020.

24/08/90: Perhaps the last 'exotic' Sporadic-E opening of the season with Hungary, Poland, USSR, Czechoslovakia, Spain, Portugal, West Germany, Italy, Austria, Switzerland, Albania, plus an unidentified Arabic station on channel-E3 at 1930 UTC.

Many thanks to the following who have supplied logs and reception reports:

Simon Hamer (SH), New Radnor; Stephen Michie (SM), Bristol; Garry Smith (GS), Derby; Bob Brooks (BB), South Wirral; Chris Howles (CH), Lichfield; Iain menzies (IM), Aberdeen; Barry Bowman (BBo), Manchester.

SERVICE INFORMATION

YUGOSLAVIA: TV Ljubljana has finally changed the identification on the PM5544 test pattern to 'TV Slovenia'. Also, RTV Zagreb has changed its name to 'Hrvatska Radio Televizija' (RTV Croatia) and the FuBK test pattern now bears the identification 'HRTV HTV1'. The opening caption still features a globe but the wording has changed to 'Hrvatska Televizija'. There are plans to replace the globe with a flag. The identification 'HTV' is displayed in the corner of the screen on programmes originating from the Zagreb studios.

In Slovenia the full Hungarian MTV-1 output ios re-broadcast in PAL (system H) from Lendava transmitter on channel E42 with 250W ERP.

SWITZERLAND: The FuBK test pattern no longer features a moving band of text advising viewers that a Teletext service is available. They now screen sample pages at frequent intervals.

USSR: Since 01/04/90 the Vilnius transmitter in Lithuania has been relaying the Polish 1st network programme (TP-1) on channel-R38 (600kW ERP). Leningrad TV is no longer relayed on this channel.

EAST GERMANY: There are plans to relay RTL+ from the East Berlin transmitter on channel-E44 with 1000kW ERP!

ICELAND: A third TV network (private PAY TV) was due to commence in Iceland on October 1st. Known as TV ONE it will eventually reach 65% of the population. A number of low-power UHF transmitters are now in use by RUV.

EAST GERMANY: All transmitters and studios throughout the GDR will be converted from SECAM to PAL before the end of 1991. There is also a rumour that DFF-1 may eventually become an ARD region and DFF-2 will carry ZDF programmes.

CZECHOSLOVAKIA: CST will also change from SECAM to PAL over the next five years.

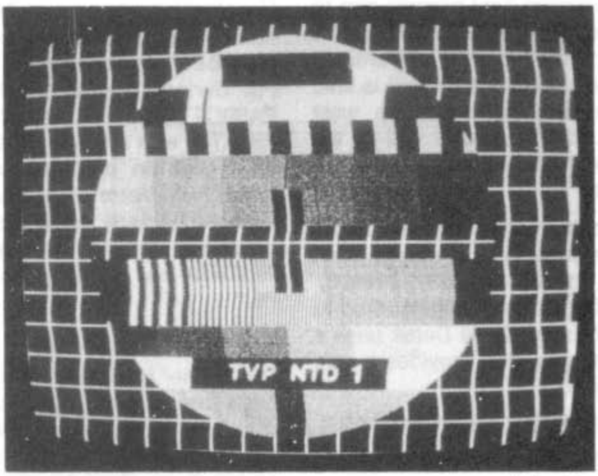
POLAND: TVP are also planning to change from SECAM to PAL. Since most, if not all, colour receivers are capable of PAL/ SECAM operation, there should be little inconvenience caused to the viewing public.

GREECE: The letters 'ET-1' appear in the corner of the screen.

BELGIUM: 'Canal Plus Belgique' is now on air from Wavre on channel-E50 with 500kW ERP. Other outlets are Liege E39 (4kW) and Anderlues E58 (200kW). PAL system-H is used, but transmissions are encrypted.

An AFN-TV outlet at Everberg is now on air using NTSC system-M (525-lines).

Information kindly supplied by Gosta van der Linden and the BDXC, Netherlands; Roger Bunney, U.K.; Dalibor Frkovic, Yugoslavia; Gary Smith, U.K.



The Polish test card with identification, normally it is blank

TV ON THE AIR

Andy Emmerson G8PTH

The time for our quarterly activity column has flown round again and once again we have news about amateur television from all round the world.

CELTIC NATIONS LINKUP

Our first port of call this time is the principality of Wales. A most enthusiastic letter from Derek GW3FDZ in Dyffryn Ardudwy. Derek's interest in ATV goes back quite a way: 'twas he who carried out the first contact between GW and GD with John Lawrence back in 1958. Of course everyone knows that 405 lines travelled better than 625 (no letters please!) but it was a major achievement in those days.

Another major achievement has been the recent revival of ATV in Eire, and one of Derek's regular ATV contacts now is Craig EI3FW who provides P5 pictures. It looks as if all Derek's contacts are fated to be across water, since his location between Barmouth and Harlech only permits him to cover the coastal area between Cardigan in the south and the northern end of Cardigan Bay. But the path across to Ireland is fine! If anyone finds themselves on the west coast of Wales, then a phone call in the evening on 03417 343 will have Derek on the air in no time.

Derek also speaks enthusiastically of an ingenious inline masthead pre-amp from RN Electronics (details on 0277-214406). This is RF switched and will withstand up to 300 watts, which is handy as Derek uses a 100W linear. The pre-amp provides a gain of 14dB on receive.

KENT TELEVISION GROUP PROGRESS

A letter from Chris G4AYT confirms that things are bubbling on the north Kent coast. He writes: "The Kent Television Group was set up at the second meeting of local amateurs interested in television on 23rd August 1990. The aim of the group in particular is to establish a 23cm amateur television repeater with a primary coverage area of north Kent, as well as to encourage activity on 23cm ATV.

"The group's executive committee consists of G4AYT, G4BBH, G6GHP, G8GHH and G8SUY. Members of the group are asked to pay an initial subscription of L10 as expenses are expected to be high in the first year. Further details of progress can be obtained from G8SUY, while subscriptions should be sent to G4AYT."

Chris adds that conditions have been very good on 23cm during the summer. "A regular signal here in Whitstable has been that of the North Norfolk repeater, GB3TN in full colour with sound. Indeed this repeater is an excellent indicator of propagation to the north from Kent. On 1st August G0KZN running a couple of watts in Lincolnshire was an excellent colour signal here in Whitstable. Many Dutch stations have been seen, including the following at P5 during August: PE1DWA, PI6ATE, PA6ROT and PE1KTO. The last of these, PE1KTO, was listening on 145.790MHz and could not be contacted as none of my three two-metre rigs can get on that channel! Activity in the area has been low on 70cm, despite some good conditions, PE1DWA and PA3CHH having been seen P5."

70CM IS STILL ALIVE

That's the feedback from several areas. Even though many operators' main sphere of activity is now 24cm, most of them can still transmit a signal on "good old seventy", so don't be afraid to ask if you are new on this band. Another word to the

wise: I hear that private mobile radio (PMR) is starting to occupy the frequencies directly above 440MHz in many areas now. There are dark rumours that a few TV amateurs transmit colour on seventy and their signals spill out above 440MHz. I cannot believe anyone would be so foolish or thoughtless, but rest assured that if there are any complaints of interference from business users, the Radio Investigation Service will be forced to look into them. Let's avoid this

NEW ZEALAND NEWS

Our regular correspondent Mike Sheffield ZL1ABS advises that he has now received his 23cm transmitter kit from the Sussex Repeater Group. He had travelled all the way from New Zealand to the BATC convention at Harlaxton to buy one, but there were no Worthing people there! Still, he had a nice letter of apology from them and no doubt everyone didn't attend this year will come to Harlaxton next year and make it an even greater success.

Recently Mike and Wayne ZL1USK gave a talk to the Auckland VHF Group entitled "What's New in ATV". They brought along some project from the NZ "Break-IN" magazine plus the teletext video generator from the BATC's "ATV Compendium". Mike had put two pages of video data into an EPROM promoting the AK group's ATV and voice repeaters. The meeting welcomed seeing this transmitted from the ATV repeater/ beacon when the trustees approve it.

On the RF front Mike displayed the Worthing transmitter kit (not yet built up) and a new 70cm AM transmitter design with subcarrier sound for portable work.

While coffee was served the Severnside Repeater Group's promo tape was seen. To round it all off a live off-air demo from Ken ZL1TVQ was a success and Mike hopes they have raised the awareness of ATV in the VHF Group.

Well done! I don't get to hear of similar ingenuity here ... I wonder why not.

RADIOVIDEOGRAPH CLUB SUCCESS

The sixth meeting of the members and friends of the Polish Radiovideograph Club took place over the weekend 19th/20th May in Debrzno near Pila (writes Stanislaw Pazur). The venue was recommended by local club SP1KOS. For the first time in the history of the club the president of the national radio club PRV, SP5HS, was there. The guest of honour was Juergen Y23NE. Around 150 people attended the meeting and a special event station SP0RVG worked on the amateur bands. A special

L to R: PRC Chairman Mr.Wojciech Cwojdzinski SP2JPG
PRV President Mr.Krzysztof Stomczynski SP5HS

brochure was produced for the meeting entitled "ATV in Amateur Radio Sport".

SP1FMH opened the meeting. In the chairman's report Mr. Cwojdzinski SP2JPG

Participants of the meeting

summed up the major events of the last year. Krzysztof Slomczynski SP5HS, president of PRV, discussed the present complicated situation in PRV and plans for the future.

The second part of the meeting is always very popular. There were some technical lectures about ATV with demonstrations (by SP2JPG) and packet radio (by Henryk SP5DED and Bartosz SP3CAI). Mr Cwojdzinski presented the interesting DF4PN mini-ATV transmitter. Members' constructions and commercially-built equipment for packet radio were also shown.

During the meeting the following officers were elected: Chairman - Wojciech Cwojdzinski SP2JPG, Vice Chairman - Henryk Ignasiak SP5DED (packet radio technique), Vice Chairman - Bartosz Pastuszak SP3CAI, Secretary - Kazimierz Slomski SP2ERD, Intercontest Manager - Krzysztof Ulatowski SP2UUU and Committee Member - Jerzy Smietanski SP9AUV.

There was a flea market as usual and the participants exchanged some interesting computer programs. The packet radio group plan to establish the gateway 3599kHz/ 144.650MHz in Warsaw for mailbox and BBS. There are 16 stations with permission to transmit packet radio.

This year is a very special one for PRC members in Poland, being the tenth anniversary of the first QSOs in SSTV and RTTY. The first two-way SSTV contact was between SP3ZHC and OZ3WP on March 3rd, 1980. Station SP3ZHC was working the special event callsign SP0PIR. In RTTY SP3CAI was first on December 23rd, 1980. As part of the celebrations the Club will organise a SSTV and RTTY contest on 21st October this year from 0600 to 1800 UTC. Cups and diplomas will be awarded to the winners. (Thanks for all this useful info, Stan. It's good to know there is so much activity coming along.)

That's it for this time. Once again most of our news has been mainly foreign: is there really nothing going on in England and Scotland?!? Write and deluge me with YOUR news!

Stand with Component and Equipment supplies

CONTEST NEWS

Bob Platts G8OZP

MAYDAY MICROWAVE

Return contest logs were, to say the least, a bit thin on the ground for this years May day Microwave contest. The number one and only slot goes to Clive and Richard from Humberside.

Clive comments on his entry form that the new secret weapon in the form of a water-cooled 2C39 performed well. The combination of this and the microwave oven (13CM or beans on toast?), which later failed, put the generator under severe strain. It was noted to be running full chat with afterburners on.

RESULTS: 24CM

Callsign	Pts	QSO's	Best DX @	Km
G8EQZ/P	1339	13	G6YKC	106

SUMMER FUN

A good day and a good turnout for the Summer fun this year with some very high scores returned by the /P big guns. Steve and Mark (Merryton low 1600 ft ASL in North Staffordshire taking top spot on both bands, with some very close jostling for positions from the other stations.

Viv G1IXE of the Bristol ATV group commented on their entry that the new secret weapon worked well for them. (As far as I have been able to establish it consists of four bricks, a box and some thick wire. I cannot confirm frog up or down for the bricks).

(Before anyone asks me, I also havn't the faintest idea what the FROG refers to, and as I received this only one day before closing and Bob is unreachable by phone I remain, like you, confused !!! ... Ed)

John and Andy G8MNY & G4WGZ operated /P from Woldingham. (850 ft ASL) but unfortunately with PMR equipment on the same site.

The WX was variable, being enveloped in cloud for much of the time. The DX was, however, good with a P3 with PE1LZZ (384Km) on 70, and a P4 with Steve G4DVN/P over 246Km on 23CM.

RESULTS: 70CM

Callsign	Pts	QSO's	Best DX @	Km
G4DVN/P	6574	26	EI6AS	294
GW7ATG/P	5988	21	G8MNY/P	297
G7ATV/P	5986	36	G8EQZ/P	250
G8MNY/P	5839	29	PE1LZZ	384
G8EQZ/P	5489	22	G4RFR/P	355
G4WRA/P	4197	24	G8EQZ/P	220
G1COI	2508	36	G8EQZ/P	250
G4AGE	979	11	G8EQZ/P	168
EI6AS	830	9	G4DVN/P	294
G6WLM	571	4	G8MNY/P	161

RESULTS: 24CM

Callsign	Pts	QSO's	Best DX @	Km
G4DVN/P	2884	11	G4WGZ/P	246
G7ATV/P	2561	26	G6YKC	215
G4WRA/P	1965	13	GW7ATG/P	150
G4WGZ/P	1658	9	G4DVN/P	246
G8EQZ/P	1030	8	G4DVN/P	117
GW7ATG/P	862	5	G3NNG	187
G1COI	620	6	G4WRA/P	85
G4AGE	265	3	G8EQZ/P	168

Activity is on the increase in Eire. Albert EI6AS, Donald EI6EV, EI7CL, EI3DM, EI6GU, EI8GB, EI3CZ and EI9s are all now active on 70CM. Unfortunately operation is not permitted on 23CMs (yet) . Albert had two good contacts with a one way

(294Km) with Steve G4DVN/P and a two way with the GW7ATG/P group over 196Km.

NOTE: The date for the AUTUMN VISION SLOW SCAN COMBINED was incorrectly printed in the last issue (151). The correct date is the **11th November**, not October as printed.

The full contest rules have not been printed for some time now, these I shall include in the next magazine as space does not permit it here. *(Threats already ... Ed)*

Finally, there have been several comments to me as to where my address is to be found. It can be found on page two along with all other club officials.

But as our professional colleagues say: 'For those who missed it earlier, here it is again'.

Bob Platts G8OZP, 8 Station Road. Rolleston-on-Dove, Burton-upon-Trent. Staffs., DE139AA.

73 ... Bob

CONTEST CALENDAR

AUTUMN VISION

Sunday 11th November

0001 GMT - 2359 GMT

Slow Scan & Fast Scan ATV all Bands.

WINTER ATV

Saturday Dec 8th - Sunday Dec 9th

1800 GMT Saturday - 1200 GMT Sunday

Fast Scan ATV all bands.

WINTER CUMULATIVE 1991

Thursday Jan 3rd, Friday Jan 11th, Saturday 19th, sunday Jan 27th

1900 GMT to 2359 GMT each session.

Slow Scan & Fast Scan ATV all Bands

Three best logs out of the four to be entered.

SPRING VISION

Saturday March 9th - Sunday March 10th

1800 GMT Saturday to 1200 GMT Sunday

FSTV all bands.

ATV, HDTV & ALL THAT

Andy Emmerson G8PTH

This article is all about ATV, but this time it's the other ATV, *Advanced Television.* Confused? I hope you won't be when you've read this ... All the same these days it seems you're not fit to follow your chosen profession or hobby unless you're in command of all the abbreviations and acronyms. Most of them are TLA's (three-letter abbreviations) in fact, but that does not make them any more meaningful at all: a few are more or less obvious (once they have been explained to you) but not all are memorable.

TV is full of these abbreviations at the moment, largely because transmission techniques and receiver technologies are changing (or at least the manufacturing interests wish they would!). Because of this you may be a bit baffled by all the jargon and I thought I'd take a little time out to try and clear things up

IMPORTANT, WELL YES ...

All of these new technologies may be important one day. It's unlikely that they will all be adopted, but some of the techniques to which they relate are bound to filter down to domestic reception and surplus equipment one day. For this reason alone - and because you like to keep abreast of what's happening in the world of TV, you may care to note what the abbreviations stand for. All of these new ideas are intended to make TV better, generally by improving the definition of the picture. That's not all, though, and there are some fundamental differences in what you do and how you do it, which may not be obvious at first sight. There is a distinction, for instance, between extended definition and improved definition.

Some improvements can be made entirely at the receiver end, but most imply changes to the transmitted signal as well. Some of the new transmission systems are compatible with existing receivers and some are not. Some use digital techniques, others are still analogue. Some of the improvements can be implemented straightaway and some can not. Some can be applied to terrestrial TV, others only to satellite or cable transmissions.

IDTV AND EDTV

The most basic split is between IDTV and EDTV. IDTV means *Improved Definition TV,* and that means adding extra lines to the structure of the signal, and that implies a fundamental change from existing TV standards. EDTV is *Extended Definition TV,* which is taken to mean anything to do with making improvements to the existing PAL, SECAM, or NTSC picture.

IDTV will retain the existing 4:3 aspect ratio of the picture (4 units wide by 3 units tall); other systems are likely to use a 16:9 'letterbox' or motion picture-style format. Further technical details are given below:

HDTV is generally taken to mean that the picture definition is greater than twice the existing resolution: anything less than this is only EDTV. HDTV schemes include 1050-line and 1125-line systems for NTSC countries and 1250-line one for Europe. These schemes have a wide ('letterbox') aspect-ratio picture.

DOSSIER

Here is a summary of the main expressions which you may come across and what they stand for.

ACTV ... advanced compatible television. An American 1050-line, 59.94Hz HDTV system compatible with existing broadcasts.

ATSC ... Advanced Television Systems Committee. A USA body investigating ATV systems.

ATV ... advanced television, i.e. anything more advanced than what we have at present.

DIGIT 2000 ... a chip set made by ITT Semiconductors and intended to be incorporated in new generation TV receivers. The chips are capable of processing PAL, SECAM, NTSC, C-MAC, D-MAC, D2-MAC and NICAM transmissions.

EDTV ... extended definition television. EDTV-WIDE involves changing the aspect ratio and adapted TVs will change picture format automatically. The extra picture information will, of course, only be seen on sets equipped to display this.

EPAL ... extended PAL. A system devised by the BBC some while ago for sending PAL signals with additional picture information in the frequencies above the 6MHz sound carrier. Suitably equipped receivers would use this to display improved pictures.

EUREKA 95 Project ... a 1250-line, 50Hz system widely backed in Europe. Conversion to/from 625 line systems is easy but 24 f.p.s. film transfer is still a problem because of the 1Hz flicker.

EUREKA EDTV ... a European 625-line, 50Hz system with 16:9 picture. Much cheaper than 1250 lines and may become a European standard.

HD-MAC ... high definition multiplexed analogue component. European proposal for HDTV by upgrading the existing MAC system. A high definition analogue video signal of about 25 MHz bandwidth is reduced so that it can fit within a transmission channel of 12MHz bandwidth.

HDTV ... high definition television. Back in 1936 this meant 405 lines monochrome TV (with absolutely no colour compatibility problems). Nowadays, it means anything better than your existing system.

HDVS ... a 1125-line, 60Hz HDTV system already in use for some television production. Most support comes from Japan. Not directly compatible with any existing system.

HIGH-SCAN ... a proprietary design of multi-standard TV receiver made by Thomson which takes normal 625 line transmissions and electronically enhances the picture. It can display both 4:3 and 16:9 format pictures and can take a HDTV adapter.

Hi-Vision ... (see HDVS).

IDTV ... improved definition television. At the transmitter end improvements can be made in encoding and filtering but most of the improvements will be in the receiver. For instance a frame store will allow the picture refresh rate to be increased to 100Hz, totally eliminating the flicker effect.

MAC ... multiplexed analogue component. Extended bandwidth transmission system intended for use on satellite and cable systems, having a high immunity to interference.

MUSE .. multiple sub-Nyquist sample encoding. Japanese signal encoding technique that reduces the amount of signal needed to send a HDTV picture.

NTSC ... (National Television Standards Committee or never twice the same colour). The existing 525-line colour system used in the Americas, Japan and elsewhere.

PAL ... (Phase Alternating Line or perfection at last). The 625-line colour system used in Britain, most of Europe, Australia and New Zealand and elsewhere.

SECAM ... (Sequence a Memoire or system essentially contrary to anything American). An ingenious and much under-rated 625-line colour system used in French territories and the Soviet bloc.

SUPER NTSC ... an American 1050-line, 29.97Hz system which is cheap to implement and completely compatible with existing NTSC channels and receivers.

NB: this list is not claimed to be exhaustive, since so many new techniques (and acronyms) are appearing now. It is hoped, however, that all the explanations are accurate and meaningful.

THE E.H.C. 24CM FM ATV RECEIVER

REVIEW

Mike Wooding G6IQM

A new venture for E.H.C.(Valves) Ltd. is this complete 24CM FM Amateur Television receiver. At the time of writing this review it is the only complete system that can be purchased in a 'ready-to-go' state. That is, that all you have to do is connect the DC shack supply, plug in a 24CM aerial, a video monitor and a loudspeaker or headphones, tune in a signal and away you go.

Alternatively, the IF board and the down converter sub-sections can be purchased separately for inclusion in your own system, or for building your own version of the receiver. If purchasing the units separately then all the necessary external components are not supplied, i.e: with the IF board the meter, controls and sockets, etc.

DESCRIPTION

The receiver is housed in a grey coloured moulded impact-proof PVA plastic box, measuring 23.5cm x 18.25cm x 9.5cm including the feet, with the control knobs on the front panel and the sockets on the rear panel making the unit 21.5cm deep in total. The case also features adjustable front feet, allowing the unit to be tilted upwards thus facilitating easier reading of the meter etc.

The front panel controls comprise from left-to-right: an ON/OFF switch, a 5.5MHz/6.5MHz switch, a TUNING control, a VID.GAIN control and a VOLUME control. Also featured on the front panel is a red LED for ON/OFF indication and the tuning-frequency meter. The front-panel bezel is sign-written with the various control and switch functions.

The rear panel connections are as follows: a 3.5mm jack-socket for the loudspeaker/headphone connection, a phono socket for video output, a BNC socket for aerial connection and a DC socket for the power supply in. Also mounted on the rear panel is a 20mm fuse holder.

Internally the receiver has a die-cast box and two printed circuit boards mounted onto the housing chassis. All earth connections are bonded to this chassis for screening continuity.

The die-cast box, measuring 120mm x 95mm x 35mm, houses the down converter with the power connections made via feed-through capacitors and the IF out by means of a coaxial cable. The aerial input socket mounted through the rear panel of the housing is a bulkhead coaxial cable connection type, connected to the down converter by a short length of coaxial cable.

The two PCB's are the wide-band IF amplifier and the IF receiver assemblies. Both boards are constructed from double-sided copper-clad material and are custom-built for each unit. All interconnecting wires and cables are neatly formed and retained with cable ties.

The TUNING control is a precision 10-turn potentiometer, thus facilitating fine-tuning of the band with only the one control. The VID.GAIN and VOLUME controls are ordinary 270 degree potentiometers. The tuning frequency meter is a standard 90 degree movement with the scale calibrated with a logarithmic frequency readout scaled in 10MHz steps, with main divisions at 1240, 1260, 1280, 1300 and 1320MHz.

CIRCUIT OUTLINE

The number of controls has been kept to a minimum, i.e: tuning, video gain, volume and changeover from 5.5MHz to 6MHz sound subcarrier. This latter switch also changes the polarity of the video output from negative on 6MHz (U.K. and most of Europe) to positive on 5.5MHz (France).

The first down converter section (housed in the die-cast box) uses parallel tuned circuits to give good rejection of broadcast TV signals, radar, and any other in-band signals. All the SHF and UHF tuned circuits are etched onto the printed circuit board, including the first local oscillator, which reduces frequency drift to a very low level after only a few minutes warm-up. The output from this first down converter is at 168MHz, which is routed to a second down converter. The second down converter is external to the die cast box and comprises a dual-IC tuned circuit, which converts the first IF of 168MHz to a second IF at 39MHz for input to the demodulator.

The 39MHz IF signal is amplified by another dual-IC circuit and then buffered by an emitter follower stage, which matches the signal to the phase-lock-loop demodulator. After demodulation the video signal passes through an emitter follower buffer stage, a standard (non-switchable) CCIR de-emphasis circuit, an audio subcarrier trap, followed by a video amplifier and a 75-ohm video output buffer.

The audio subcarrier is extracted at the buffer stage following the demodulator and is fed into a switchable filter network to select either 5.5MHz or 6MHz filters, depending on the signals being received. After the filter stage the signal is routed into a single IC audio demodulator and output stage. The audio volume control varies the output from 0 to 1W into an 8-ohm load or 2W into a 4-ohm load.

The receive frequency indication meter is driven by sampling the tuning voltage applied to the varicap tuning diode. A potentiometer network allows the meter range to be adjusted to compensate for the different characteristics of different varicap diodes.

BENCH TESTS

In view of the fact that the receiver is supplied as a complete unit the nature and depth of the bench tests were different compared to other reviews I have conducted in the past. However, what I consider to be the essential tests I was able to carry out, and the results are shown below.

The test equipment used for these measurements was as follows:

Marconi 2383 Spectrum Analyser and Tracking Generator.

Racal Dana 9087 Signal Generator.

Philips PM5646 Television Pattern Generator.

Hewlett Packard 8903B Audio Analyser.

Philips PM3226 Digitising Oscilloscope.

Fluke 8050A Digital Multimeter.

Racal Dana 9232 Bench Power Supply.

The noise floor of the receiver with the aerial input terminated with a 50-ohm load was averaged out at -85dBm. Three spurious signals were found at 1116MHz at a level of -25dBm, 2232MHz at a level of -35dBm and 3348 at a level of -60dBm. However, although they were at not inconsiderable levels, there did not appear to be any detraction in the performance of the down converter.

N.B: It ought to be said here that in virtually all circuits employing these relatively simple, but stable oscillators working at the direct conversion frequency, harmonics and spurious signals will inevitably be produced. The trick is to tailor the circuitry such that they are either suppressed, or at frequencies outside the operating range of the receiver itself. Also, care must be taken that these harmonics and spurious signals do not de-sensitise the front end of the converter, especially when employing GaAsFET devices and strip-line techniques.

The sensitivity of the receiver was then checked by injecting signals from the Racal Dana 9087 Signal Generator and tracking the output of the second IF stage with the Marconi 2383 Spectrum Analyser. With an input frequency of 1249MHz a level of -71dBm was required to give an IF signal 3dB up on the noise floor, or in other words just about the minimum signal level that could be detected as 'Syncs'. At the other end of the band, 1320Mhz, a slightly lower input level of -72dBm was required to give a 3dB lift. These signal levels of around -70dBm equate to a performance of the receiver similar to that of most of the equipment at present operated by ATV'ers.

The maximum signal levels before the IF stages went into limiting were -29dBm at 1249MHz and -27dBm at 1320MHz, which indicated a good large signal handling capability (-30dBm is equivalent to 1mW).

Owing to the inability of being able to apply an external modulating signal greater than 100kHz to the Racal Dana Signal Generator, I had to inject a modulated signal into the demodulator itself at the second IF frequency from the Philips PM5646 Television Pattern Generator, and view the output on a video monitor. The resulting picture showed good definition and a linear chrominance response.

Using the same method as above a 1kHz audio signal was also injected from the Philips Test Pattern Generator and the resultant audio signal measured on the HP 8903B Audio Analyser. The frequency recovery was found to be excellent, with the measured output signal reading 998Hz. The distortion level at maximum output into an 8-ohm load was measured at 3.154%.

The current drawn by the receiver at a supply voltage of 13.5V was 225mA with no audio output and 520mA at full audio output.

OFF-AIR TESTS

To conduct the off-air tests I simply compared the unit against my own Wood & Douglas/BATC home brew system, which has returned me excellent results in the past. Having two 24CM aerials of the same type and at the same height, and separate video monitors made this task easy.

Firstly, I used the signals from GB3RT, the Coventry 24CM FM ATV repeater, which I receive normally at P5 (broadcast quality). The pictures from the review unit were equally as good as my own system once the correct video output level was obtained with the front panel control. The tuning control, being a multi-turn type, allowed for easy tuning across the signal, enabling me to fine tine with considerable ease. The picture did have a tendency to bounce about somewhat until the correct tuning point was achieved and the demodulator took a second or two to stabilise. This I took to indicate that due to the strength of

the received signal the IF stages were in limiting and hence perhaps slightly overloading the following stages. This has to be tempered a little by explaining that the signals I receive from GB3RT, although it is some 16kM away, are very strong indeed.

Next, I turned the aerials northwards towards GB3GV, the Leicester 24CM FM ATV repeater, which I normally receive around a P3 to P4. The results from the review unit were marginally worse than my own unit as far as the strength of the received picture was concerned, but the actual definition of the picture itself was to all intents and purposes identical.

Having checked at the top of the band it was time to see how it fared where most of us operate, at the bottom end, around 1249MHz. For this purpose I enlisted (as usual) the good offices of my fellow GB3RT group members Tony G0HOV and John G1IJT. The received pictures all exhibited good video definition and chrominance response (apart from Tony's camera that is - but that is another story, yet to be told!). By moving the aerial array away from each station I was able to simulate very low received signals, and only at very low levels was the review unit found to be less sensitive that my own, but this was at picture strengths barely reportable as P1 (just discernible prominent features - locked syncs).

The final test was to monitor my own transmissions. Again with the aid of Tony as the receiving station (for licence complicity purposes you understand) I transmitted at an output power level of 2.5W from my basic transmitter, and then at 60W with my linear amplifier coupled in. The results from the review unit at both power levels were the same, and quite a bit worse than with my own system. The resultant video output was quite unstable at times, with obvious sync crushing taking place in the overloaded demodulator. As with my own system, there was also a multitude of points along the tuning scale where my transmissions could be found.

Perhaps this test is a little unfair in expecting the unit to perform without fault, but it must be remembered that this is the modus operandi in ATV shacks. The ability to monitor your own transmitted signal is a must, and most of us admit to doing it by using our own receivers, rather than by 'sniffing' the output RF and demodulating that back to video.

CONCLUSIONS

Overall I quite liked the unit. As it stands it is at present the only complete receiver available fully built, aligned and ready to go. The presentation is tidy and the operation simplicity itself.

I do not really like the external video output level control. I feel that the output should be internally preset to 1V at 75-ohms, which is the international standard. This would overcome the tendency of many people to incorrectly drive their video monitors and cause poorer pictures to be displayed.

I also feel that the CCIR de-emphasis network should be made switchable. There are many, many stations who do not use pre-emphasis in their transmissions, or at best, incorrect levels of emphasis. To be able to select the de-emphasis network allows for the correct reception of such signals. Otherwise, poorly defined and blurred pictures result, which hardly helps to boost confidence in the receiver.

Apart from the above the receiver is good value for money, and for those to whom building a receive system is a nightmare would be an ideal solution.

The 23CM ATV receiver is available from E.H.C.(VALVES) Ltd., 7 Pavement Square, Lower Addiscombe Road, Croydon. Tel: 081 654 7172, at a cost of £230.00 including VAT. Carriage is extra at £3.34.

I wish to thank Brian Aylward of E.H.C.(VALVES) Ltd, for the loan of the review unit and for his help and assistance.

SEVERNSIDE TELEVISION GROUP

24 cm FM TV TRANSMITTER

Our state of the art 24 cm FM TV Transmitter gives a solid 2.5 W output on two switchable channels - 1249 and 1255 MHz are standard, but others are available to order. The ready assembled unit has both line and mic level audio inputs for inter-carrier sound, and front panel audio and video gain controls. The RF circuitry is state of the art, featuring surface mount components, superb stability, SP5060 pll chip and the SC1043 pa module. See the review in CQ-TV 150. The price is **£245.00** plus £5.00 postage.

COMPLIMENTARY 20 W PA

A 20 W pa using the high power SC1040 pa module is now available to go with the 24 cm Transmitter. The cost is £150.00 plus £5.00 postage.

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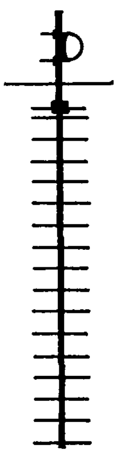
Our 23/24 cm GaAsFET pre-amplifier really is the hottest design around, and yet it is still very stable. See the review in CQ-TV 150. The typical gain is 17 dB with a noise figure of only 1 dB. The gain across the 23/24 cm band is flat, but there is 8 dB of rejection at 700 MHz, thus helping to reduce broadcast TV breakthrough. All this is achieved by the ATF 10135 GaAsFET in a state of the art circuit using surface mount components and careful screening between input and output. The pre-amp is fully boxed and assembled (but not weatherproof) and does not contain RF change-over circuitry. The price is £52.00 plus £1.50 postage.

Cheques payable to AZTEX ELECTRONICS. Send to Ken Stevens G4BVK, Aztex Electronics, 20,Coberley, Footshill Rd., Hanham, Bristol BS15 2ES. Tel. 0272 677 005 after 7 pm or weekends. Please send an SAE for full details on any of our products. Delivery 28 days.



As over 250 users from all over the UK will know, the STG 18 element wideband yagi is the affordable aerial for 23/24 cm ATV. Don't forget that your aerial must cover all the band for repeater working. Just look at some of its star features ;

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Copy should be sent to the Editor at 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF before 20th December. Tel: 0788 890365.

FOR SALE

BIRD POWER SENSORS for Bird Thruline Power Meters. Each sensor has recently been calibrated on a Hewlett Packard calibration rig. Phone for types. All at £20 each p&p included. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Work 0788 576125 x35, Home 0788 890365 (answerphone).

C-MOUNT TV LENSES. 1 off COSMICAR 12.5mm f1:1.9 ... £5 plus carriage. 1 x VARIFOCAL 16 TO 32mm f1:1.6 ... £25 plus carriage. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Work 0788 576125 x35, Home 0788 890365 (answerphone).

BELL CURRENT METER Model 1776 complete with P102 clamp, plus full service manual ... £30 ono. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Work 0788 576125 x35, Home 0788 890365 (answerphone).

13CM 38-Element Yagi (Micromax). Unused in perfect condition ... £40 ono, buyer collects. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Work 0788 576125 x35, Home 0788 890365.

SPECTRUM ANALYSER, Hewlett Packard HP140B main frame with nelson_Ross Electronics analyser plug-in type PSA532A. Frequency range 0.01 to 6.5GHz. Both items in good clean working condition, worth over £2000, will accept £1300 ono. Tel: Camtech Electronics 0440 62779, or Fax Mr.D.Allen on 0440 714147.

PHILIPS B/W CAMERAS (LDH0026), some working, some without tubes. They require a 9 volt supply - circuits available. No lenses or lens mounts. 14 in total ... £70 the lot or £7.00 each plus p&p. Fred Allart G8SVR, 18 Front Street, Sherburn Hill, Co.Durham, DH6 1PA. Tel: 091 372 0923.

VIDEO EQUALISER AMPLIFIERS made by Vicon. Independent gain and HF (chroma) controls. 3 units in 1U 19" rack module - with circuit diagram ... £15. Videomatte 2-channel colour vision mixer with caption keying from third camera/computer. tally light board fitted and service manual included ... £150 ono. Large (19.25"x13.25"x8") sloping panel case with handles with new RS 6U front panel (worth £18 alone) ... only £25. Videon colour digitiser for Amiga 500/2000 computer. PAL input - no coloured filters required. Digitises still pictures in various Amiga modes, including high resolution and HAM. Uses computer RGB port to monitor video input and computer output. As new ... £150. Various stereo/mono audio mixers ... £60 for all three, or will sell separately: No.1: Disco mixer, 2 mic inputs, 2 deck inputs and a tape/line input - with PSU. Unused ... £30. No.2: Battery powered mic/line mixer ... £7. No.3: Six input mic/line mixer with monitoring ... £45. Add postage and delivery to all above prices. David Wilson, 7 Massie Close, Willen Park, Milton Keynes, Bucks. Tel: 0908 665106.

QUALITY TV LENSES: set of three Dallmeyer Vidiac Super Sixes, boxed as new, complete with lens caps, plus one spare. Mount is 1.5" (not C) type. 1", 2" and 3", all f1.9, to go to good home. Ideally swap for C-mounts or sell. Illuminated diascope for I.O. camera, new condition, with power supply for lamp. Slides onto lens, takes two 2" x 2" slides ... £50 or swap. Dallmeyer motorised 2" lens, not C-mount but screws direct onto front of Pye Lynx ... £5. High voltage capacitors, ideal for your linear! Four 220uF at 400V with clips, new ... £6. Two 1000uF at 400V, ex recent equip ... £4 pair. Postage £1.50 extra. Practical Television: I have many 1950s and 1960s issues for disposal ... 25p each including postage. Send me your wants list! JVC HR-7600MS multi-standard VHS recorder. Handles PAL, SECAM, MESECAM, NTSC 3.58 and NTSC 4.43; VHF/UHF system I tuner. I have had it from new and it is all in very good condition, complete with paperwork. Haggle around ... £125. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

ATARI TURBO DIGITISER ... £50. Atari SSTV Interface and software ... £25. Barry Trigger G6IKQ, 2 Stocking Lane, Shenington, Nr.Banbury, OX15 2NF. Tel: 029 587 684.

74150 IC's. Brand new - Maplin price is £1.80 each. Stock up now at sensible prices ... £5 for a tube of 15, or 10 tubes for £40 (i.e: less than a sixth of list price!). Sony AV3400CE portable video recorder, in good clean working order, with original carrying case ... £30. Carriage at extra cost - larger items are best collected. Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel: 0734 403121.

SURPLUS PROFESSIONAL EQUIPMENT: SONY SEG370P PAL SPECIAL EFFECTS GENERATOR. 19" rack or bench mounting professional unit made during 1970. Provides 6 Video Inputs, dissolve between any 2, 8 wipe patterns including circles and ellipses, Internal/External Keying and Matte, Colouriser with Luminance, Hue and Saturation controls, Preview and Programme Video Outputs and Tally Light Switching. To utilise all features requires sync., blanking, PAI ID, Burst Flag and reference sub-carrier inputs. Complete with Operating Manual, Service Manual and all Circuit Diagrams (copies available separately) ... Offers. SYSTEMS VIDEO 1258 VIDEO WAVEFORM MONITOR. Microprocessor controlled instrument to display on calibrated graticule PAL and NTSC video insertion Test Signals. Fully working and mounted in 19" rack with 1255 (see next item) ... Offers. SYSTEMS VIDEO 1255 VIDEO VECTORSCOPE. Microprocessor controlled instrument to display on calibrated graticule the various PAL and NTSC vectors. Fully working and mounted in 19" rack with 1258 (see last item) ... Offers. A. Kitching, 7 West Terrace, Great Ayton, Middlesborough, Cleveland, TS9 6PA. Tel: 0642 722812 (any time).

23/24CM RECEIVE PRE-AMPLIFIER by LMW Electronics. 14dB gain at 1250MHz, 12V operation, mounted in an open PCB enclosure fitted with BNC connectors ... £10. MICROWAVE MODULES 70CM ATV CONVERTER, UHF TV band IF output, good order, circuit (I think) ... £9. SHIBADEN HV-40SK B&W vidicon camera. Complete but I seem to remember an intermittent PSU fault, will need setting-up. Composite video output, external sync locking, c/w Cosmicar1.9 25mm TV lens ... £20. COSMICAR f1.9 12.5mm wide-angle TV lens ... 315. ELECTRET gun microphone, with interface connections - new ... £5. ELECTRONIC VIEWFINDER, swivel head, 8-pin connecting lead, new, with circuits etc ... £12. VIDEOTEX MODEM card for IBM-PC or PCXT, GPO approved, with handbook and instructions, mounting kit, telephone connecting lead, brand new and boxed ... £15. BATTERY CONVERTER module, TA92, for converting a Ferguson TX-9 colour TV for 12V battery operation. No doubt it will work just as well with other sets, brand new and boxed, with gen ... £15. CAMERA EXTENSION CABLE, 10M long, 12-way standard video connectors, originally bought for a Ferguson camcorder, new and unused ... £10. All equipment believed to be in first class working condition unless otherwise stated. carriage at cost or collect. John Wood G3YQC, 43 Lunn Avenue, Kenilworth, Warks, CV10 1DS. Tel: 0926 512358.

MTV 435MHz ATV TRANSMITTER, 20W PSP ... £100. MMC 435/600 ATV converter, 435MHz in channel 35 out ... £20. Pye Super Lynx camera c/w 2 C-mount lenses, 51mm/f1.9 and 12.5mm f1.9 ... £30. Yaesu FT480 2M multimode, 10W ... £230. MMT 432/144 transverter, multimode, 10W ... $100. MML30 linear amplifier, 2M, 30W + pre-amp ... £50. Richard Weston G0LIB. Tel: 0761 32857.

COMPLETE 70CM ATV TRANSCEIVER, comprising Wood & Douglas Downconverter (Ch.36), GaAsFET pre-amp, Wood & Douglas 10W transmitter + ATV Modulator, Bandpass Filter, all built into a dual diecast housing. Also includes a 2C39A 50W Linear Amplifier and PSU ... £125. Barry Trigger G6IKQ, 2 Stocking Lane, Shenington, Nr.Banbury, OX15 2NF. Tel: 029 587 684.

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MARCONI SAWTOOTH & GREY SCALE GENERATOR ... offers. Paul Marshall. Tel: 0522 703348

PO No11 WAVEFORM MONITOR, 4U rackmount, working, please phone for details. Mr. Horrocks. Tel: 061 766 6269.

EXCHANGE & WANTED

WANTED: REMOTE EDIT CONTROL LEAD for an RM-430 editor. Wide-angle lens or converter for JVC KY1900 camera, also remote zoom control for the same. Sony RM-4400 edit controller and Sony ECM-50 PSW microphone. Peter Snell. Tel: 0634 719962 evenings.

WANTED: 70CM ATV TX or 70CM ATV amplifier to go from 150mW to at least 5W. Rod Power EI3CZ, Corballis Cottage, Mount Seskin, Saggart, Co.Dublin, Eire. Tel: Dublin 582287.

WANTED: To complete my collection: Akai quarter inch VTR, any model considered, and/or service manual for the same. Service manuals for VTR's: Sony 3620, Sanyo 1360, Hitachi SV610DK, national NV3085, Sony U-matic VP2030, Shibaden SV700. Martin Loach G8UDJ. Tel: 0865 735821.

WANTED: Renovating Ampex VR7003 1" VTR. Urgently require set of drive belts and idler wheel tyres. Also need circuit diagram of Tektronix RM529 waveform monitor and any information on Questech 3000 video A/D.D/A and RHL model 50 video wipe FX mixer. All expenses paid. Steve Catlin. Tel: 0604 847467 evenings.

WANTED: Back issues of CQ-TV. I need issues 130, 141 and 145. I also need a copy of the RSGB Handbook. Please send details to K.H.Dressen, Krahnenburgstr. 29, 4000 Dusseldorf 30, West Germany.

WANTED: Can anyone supply a copy of the circuit diagram for a Ferguson satellite TV modules type SM01. All expenses paid. Keith Parker, 20 Herbert Road, London, N11 2QN.

OLD CAMERA TUBES (and similar imaging devices) of various types and age, and related data etc., for historic (!) collection. Particularly welcome would be an Orthicon, an Ebitron, EMI 9831 2/3" Vidicons, an Image Isocon or a 1.5" Vidicon. Tubes that are not operable are suitable, so if you replace tubes in cameras don't throw the old ones away , but please contact: Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel: 0734 403121.

WANTED: Has anyone got a circuit for an Amstrad SRX2000 Satellite Receiver? I need it to experiment with an Astec AT2332. I will refund all costs. Fred Allart G8SVR, 18 Front Street, Sherburn Hill, Co.Durham, DH6 1PA. Tel: 091 372 0923.

WANTED: Basic Television (Technical Press), volume 2 only. Murphy industrial TV camera (the one with a fibreglass case!). Band I set-top antenna, the type with a large loop and a walnut bakelite base. All old TV literature, especially CCTV sales leaflets and catalogues. 2" x 2" slides of test cards and captions to borrow and copy or buy . Callsign generator or similar using real diodes in a matrix. Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

WANTED: CQ-TV, CQ Centre receiving converter 23CM input UHF Ch.36 out. H.Clark G3SOR. Tel: 0983 296538.

WANTED: SONY B&W CAMERA type HVM100CE & DC adaptor type DCP80 or 85 for V7 or V8 Sony Camcorder. Also wanted Service Manuals for the following power adaptors: ACP85, ACP88, BCA85, DCP80, DCP85 and ACV8E/V8UB. Chris Maxwell G8MKT, 24 Jensen, Tamworth, Staffs., B77 2RH. Tel: 0827 285949.

WANTED: ASTEC 1020 TUNER for the proposed North Kent FM ATV Repeater. Ron G6GHT. Tel: 0843 292802.

WANTED: PRECISION PHASE POTENTIOMETER for TEK 526 vectorscope, Part No. 119-0056-00. 10k log W.W. neg. grid volt pot. for AVO type 160 Valve Tester, also value characteristics book for above. Mike G8CTJ. Tel: 0455 250570 (anytime).

WANTED: SET OF CHROME WHEEL TRIMS for my O.B. van, 8-stud wheels. Source of rubber door trim approximately 1/2" round with 'attachment foot' on tangent. Rack mount kit for Barco 3/37 monitor. Largish tangential fan about 36 sq. in. outlet, lots of air but quite slowly. Mains three pin Niphan fixed plug 30A sixe (I think). Viewfinder and CCU for Sony DXC1800 camera. Any Marconi Mk8 equipment, modules, handbooks, W.H.Y. Brian Summers G8GQS. Tel: 081 998 4739.